Science and Elementary Technology

Primary 4

Teacher's Guide

FOREWORD

Dear teacher,

Rwanda Basic Education Board is honoured to present to you the Primary Four Science and Elementary Technology teachers' guide which serves as a guide to competence-based teaching and learning to ensure consistency and coherence in the learning of Science and Elementary Technology subject. The Rwandan educational philosophy is to ensure that learners achieve full potential at every level of education which will prepare them to be well integrated in society and exploit employment opportunities.

In line with efforts to improve the quality of education, the Government of Rwanda emphasizes the importance of aligning teaching and learning materials with the syllabus to facilitate their learning process. Many factors influence what they learn, how well they learn and the competences they acquire. Those factors include the relevance of the specific content, the quality of teacher's pedagogical approaches, the assessment strategies and the instructional materials available. We paid special attention to the activities that facilitate the learning process in which students can develop ideas and make new discoveries during concrete activities carried out individually or with peers. With the help of the teacher, students will gain appropriate skills and be able to apply what they have learnt in real life situations. Hence, they will be able to develop certain values and attitudes allowing them to make a difference not only to their own life but also to the nation.

This is in contrast to traditional learning theories which view learning mainly as a process of acquiring knowledge from the more knowledgeable who is mostly the teacher. In competence-based curriculum, learning is considered as a process of active building and developing of knowledge and understanding, skills and values and attitude by the students where concepts are mainly introduced by an activity or situation that helps the students to construct knowledge, develop skills and acquire positive attitudes and values.

In addition, such active learning engages students in doing things and thinking about the things they are doing and they are encouraged to bring their own real experiences and knowledge into the learning processes. In view of this, your role is to:
- Plan your lessons and prepare appropriate teaching and learning materials.
- Organize group discussions for learners considering the importance of social constructivism suggesting that learning occurs more effectively when the learners works collaboratively with more knowledgeable and experienced people.

- Engage learners through active learning methods such as inquiry methods, group discussions, research, investigative activities and group and individual work activities.
- Provide supervised opportunities for learners to develop different competences by giving tasks which enhance critical thinking, problem solving, research, creativity and innovation, communication and cooperation.
- Support and facilitate the learning process by valuing learners' contributions in the class activities.
- Guide learners towards the harmonization of their findings.
- Encourage individual, peer and group evaluation of the work done in the classroom and use appropriate competence-based assessment approaches and methods.

To facilitate you in your teaching activities, the content of this teacher's guide is self-explanatory so that you can easily use it. It is divided in 3 parts:

The part 1: Explains the structure of this Teacher's guide and gives you the methodological guidance;

The part 2: Gives the sample lesson plans as reference for your lesson planning process;

The part 3: Provides the teaching guidance for each concept given in the student book.

Even though this teacher's guide contains the answers to all activities given in the student's book, you are requested to work through each question and activity before judging learner's findings.

I wish to sincerely appreciate all people who contributed towards the development and editing of this teacher's guide, particularly REB staff who organized the whole process. Special gratitude goes to illustrators and designers who diligently worked to successful completion of this teacher's guide. Any comment or contribution would be welcome for the improvement of this teacher's guide for the next edition.

Dr. MBARUSHIMANA Nelson
Director General, REB

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Joan MURUNGI
Head of Curriculum, Teaching and Learning Resources Department

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INTRODUCTION TO THE TEACHER'S GUIDE

A perfect guide for a science teacher is one that provides support to the teacher to engage the learners in joyful learning. This teacher's guide has been developed for the teachers of Rwanda for the study of Science and Elementary Technology. The aim and objective of this course is to educate teachers to help them represent the science and Elementary Technology lessons among the upper primary learners efficiently. This guide contains a sample lesson plan for the teachers as well as some experimental work.

The syllabus of Science and Elementary Technology for Primary 4 has got six Topic Areas (Tools and Objects production, ICT, Our environment, The human body, Energy and materials and state of matter) further broken down into 14 units. These include:

1. Agricultural Tools
2. Objects Production
3. Computer My Friend
4. Writing Skills
5. Graphics and Multimedia
6. Programming for Children
7. Air, Wind and Sound
8. Soil
9. Animals
10. Animals Management
11. Plants
12. Human Sensory Organs
13. Human Skeleton
14. Muscles

In this course material, each unit is divided into lessons having a specific objective. For each lesson the following are indicated:

- Objectives relating to knowledge and understanding, acquisition of skills, attitudes and values.
- Activities that are expected to engage the learners in an interactive learning process as much as possible.
- Its assessment criteria and the materials (or resources) that are expected to be used in teaching and learning process.

This teacher's guide guides the teachers to take their classes in a methodical and scientific way. It contains additional information on each topic which a teacher can use for the better understanding of a learner. All questions are provided with answers.

It is very important for the teachers to read this guide carefully before attending their classes.

PURPOSE OF THE TEACHER'S GUIDE

This teacher's guide is for the upper primary science curriculum. It suggests the ways through which the teachers of science can implement the curriculum effectively in the classroom. The guide helps the teachers and provides needful direction to develop their lesson plans for the achievement of the learning outcomes. It also provides the teachers additional information to:

- Plan classroom organisation,
- Select appropriate teaching and learning strategies,
- Develop lesson plans suitable to your class,
- Plan and conduct assessment to monitor the learners learning and achievement of learning outcomes.

USING THE TEACHER'S GUIDE

When you receive your upper primary science curriculum and teacher's guide, you need to do the following:

- Read teacher's guide carefully,
- Become familiar with the curriculum, the topic area and the units,
- Read each section of the teacher's guide again and take note of those ideas, strategies and processes that you think will be useful to you,
- Meet other teachers, share your ideas and plan how you will work together to write programs and units of work,
- Be confident to develop your own lesson plans and assessment strategies using the information in the teacher's guide and subject curriculum.

Time Management of the Respective Units and Lessons			
Unit	Content (Lessons)	No. of periods	Total periods
Unit 1: Agricultural Tools	Identification of Agricultural Tools	1	10
	Uses of Agricultural Tools	2	
	Maintenance of Agricultural Tools	2	
	Storage of Agricultural Tools	1	
	Dangers of the Misuse of Agricultural Tools	1	
	Precautions while Using Agricultural Tools	2	
	Unit Revision	1	
Unit 2: Objects Production	Making Toy Bicycle and Doll	2	14
	Making Toy Cat and Motorcycle	2	
	Making Basket (A Utility Object)	2	
	Making Dustbin and Mat (Utility Objects)	3	
	Making Learning Materials	3	
	Maintenance of Toys, Utilities and Learning Objects	1	
	Unit Revision	1	
Unit 3: Computer My Friend	Computer	1	16
	Data and Information	1	
	Communication	1	
	Technology	2	
	Activity and Project	1	
	Digital and Analogue Data	1	
	Hardware and Software	1	
	Sugar Interface	2	
	Gnome Interface	2	
	The Journal	2	

	Searching and Retrieving a Saved Document in the Journal	1	
	Unit Revision	1	
Unit 4: **Writing Skills**	Text Selection	2	8
	Formatting Text	2	
	The Keyboard and Touchpad	3	
	Unit Revision	1	
Unit 5: **Graphics and** **Multimedia**	Paint Application	1	5
	Toolbar	1	
	Drawing : with Free Hands Using Shapes	1	
	Comments on a Picture and Save, Close and Open an Activity	1	
	Unit Revision	1	
Unit 6: **Programming** **for Children**	Turtle Art	1	20
	Elements of Turtle Art Window	1	
	Using Turtle Art Instructions/Commands	3	
	Drawing	2	
	Saving a Document, Closing and Opening Turtle Art Activity	2	
	Scratch Window	5	
	Object Animations (Animate an Object)	5	
	Unit Revision	1	
Unit 7: **Air, Wind** **and Sound**	Main Properties of Air	2	14
	Composition of Air	1	
	Utility of Air Components in Daily Life	1	
	Dangers of Components of Air	1	
	Wind and its Types	1	
	Uses of Air and Wind	1	
	Dangers of Wind	1	
	Sound	5	
	Unit Revision	1	

Unit 8: Soil	Definition of Soil	1	12
	Types of Soil	1	
	Composition of Soil	2	
	Uses of Soil	2	
	Characteristics of Fertile Soil	1	
	• Soil Erosion • Agents of Soil Erosion	1	
	Causes of Soil Erosion	1	
	Types of Soil Erosion	1	
	Prevention of Soil Erosion	1	
	Unit Revision	1	
Unit 9: Animals	Classification of Animals According to the Backbone	1	12
	Classes of Vertebrates and Invertebrates	1	
	Classification of Animals According to the Respiration Mode	3	
	Classification of Animals According to the Locomotion Mode	2	
	Classification of Animals According to the Feeding Mode	2	
	Classification of Animals According to their Reproductive Mode	2	
	Unit Revision	1	
Unit 10 : Animals Management	Conditions of a Good Rabbit Hutch	1	12
	Characteristics of Good Rabbits	1	
	Distinguishing Male from Female Rabbits	1	
	Criteria for Choosing a Rabbit to Rear (Rabbit Breeding Guide)	2	
	Proper Feeding of Rabbits	2	
	Rabbit Health	1	
	Common Diseases in Rabbits	1	
	Importance of Rabbit Farming	2	
	Unit Revision	1	

Unit 11: Plants	Definition of Germination Conditions Necessary for Seed Germination	1	14
	Types of Germination	2	
	Stages of Germination	4	
	Types of Plants	2	
	Parts of Plants and their Functions	2	
	Unit Revision	2	
Unit 12: Human Sensory Organs	Functional Mechanism of All Sensory Organs	2	25
	Structure, Function and Maintenance of Skin	4	
	Structure, Function and Maintenance of Tongue	4	
	Structure, Function and Maintenance of Nose	4	
	Structure, Function and Maintenance of Ear	4	
	Structure, Function and Maintenance of Eye	5	
	Unit Revision	2	
Unit 13: Human Skeleton	Main Parts and Major Bones of the Skeleton	2	10
	Functions of the Skeletal System	1	
	Accidents of Bones	2	
	Bone Diseases	1	
	Hygiene of the Skeleton	2	
	Prevention of Bone Diseases and Deformation of Vertebral Columns	1	
	Unit Revision	1	
Unit 14: Muscles	Main Groups of Muscles	1	8
	Major Voluntary Muscles of the Human Body	2	
	Functions of Voluntary Muscles	1	
	Accidents of Muscles (Cramp) and First Aid	2	
	Hygiene of Muscles Prevention of Accidents	1	
	Unit Revision	1	

PEDAGOGICAL APPROACH

The constructivist approach of teaching science which reinforces the inquiry-based instruction will be at the heart of the implementation of the new revised syllabus.

Role of the learner

The approach considers the learning process to involve the construction of meaning by learners.

- Simply, it emphasises the need for learners to think about scientific activity in order to make sense of and understand the scientific concepts being introduced. Traditionally, science instruction has relied heavily on teacher-led, direct instructional strategies with learners being the recipients of knowledge.
- In this syllabus, learners are in the driver's seat which implies that, they will construct their knowledge by posing question, planning investigation, conducting their own experiments, analysing and communicating results.
- More specifically, while engaging in inquiry, learners will describe objects and events, ask questions, construct explanations, test those explanations against current scientific knowledge and communicate their ideas to others. By so doing, the learners will take ownership of the learning process.

Over time, learners will get involved in the following activities:

- Observing and, where possible, handling and manipulating real objects;
- Pursuing questions which they have identified as their own even if introduced by the teacher;
- Taking part in planning investigations with appropriate control to answer specific questions;
- Using and developing skills of gathering data directly by observation or measurement and using secondary sources;
- Using and developing skills of organizing and interpreting data, reasoning, proposing explanations, making predictions based on what they think or find out;
- Working collaboratively with others, communicating their own ideas and considering others' ideas;

- Expressing themselves using appropriate scientific terms and representations in writing and talk;
- Engaging in lively public discussions in defense of their work and explanations;
- Applying their learning in real-life contexts;
- Reflecting critically about the processes and outcomes of their inquiries.

These activities will help learners to not only acquire the content knowledge, but also a number of skills including how to approach a problem, identify important resources, design and carry out hands-on investigations, analyse and interpret data, and, perhaps most importantly, recognise when they have answered the question or solved the problem.

Role of the teacher

The role of the teacher will remain critical however. Instead of being the "sage on the stage", the teacher will rather be "the guide on the side" who acts as a facilitator in a variety of ways which include:

- Encouraging and accepting learner autonomy and initiative;
- Using raw data and primary sources, along with manipulative, interactive, and physical materials;
- Using cognitive terminology such as classify, analyse, predict, and create while framing tasks.
- Allowing learner responses to drive lessons, shift instructional strategies, and alter content;
- Familiarising themselves with learners' understandings of concepts before sharing their own understandings of those concepts;
- Encouraging learners to engage in dialogue, both with the teacher and one another;
- Encouraging learner inquiry by posing thoughtful, open-ended questions and asking learners to question each other;
- Seeking elaboration of learners' initial responses;
- Engaging learners in experiences that pose contradictions to their initial hypotheses and then encouraging discussion;
- Providing time for learners to construct relationships and create metaphors; and
- Nurturing learners' natural curiosity.

Special needs education and inclusive approach

All Rwandans have the right to access education regardless of their different needs. The underpinning of this provision would naturally hold that all citizens benefit from the same menu of educational programs. The possibility of this assumption is the focus of special needs education. The critical issue is that we have persons/learners who are totally different in their ways of living and learning as opposed to the majority. The difference can either be emotional, physical, sensory and intellectual.

These learners equally have the right to benefit from the free and compulsory basic education in the nearby ordinary/mainstream schools. Therefore, the schools' role is to enrol them and also set strategies to provide relevant education to them. The teacher therefore is requested to consider each learner's needs during teaching and learning process. Assessment strategies and conditions should also be standardised to the needs of these learners.

Teaching and Learning Strategies

To assist and encourage learners to learn, you perform certain tasks. These are referred to as teaching strategies. You need to engage learners directly in learning but there are times when you have to take charge of the learning in the class and teach particular concepts or ideas.

Some useful teaching strategies are:

Lecture: If a demonstration covers skills, teachers will often use a lecture to reach knowledge-based objectives. Teachers choose to lecture when they have a limited amount of time, when the background information is not available or easily accessible to learners (e.g., the material is not in print), or when the concepts could be best clarified through verbal explanation.

Brainstorming: This method is used in groups to support and encourage creative problem solving.

Discussions: Discussions are a way of exploring issues. Discussions can occur between teacher and learners or between learners themselves.

Debates: A debate is a fair and formal way of discussing a topic or an issue. It normally takes place after preparations from two groups – one for the topic and one against the topic.

Group Work: The purpose of group work is to give learners opportunities to share ideas and at the same time learn from group members. Every group should have a group leader to supervise the group's activities such as delegating tasks and consulting the teacher. Group work activities can take place anywhere: in the classroom, under a tree, on a riverside, at the beach, in a forest or school garden.

Role play: In role play learners imitate the behaviour or characteristics of something.

Peer teaching and learning: This is organised as a partnership activity. One learner performs while the other observes and assists in making corrections and suggesting new ideas and changes. The teacher's role in this strategy is to observe as well as encourage positive interaction and effective communication through which the intended outcome is achieved.

Demonstrations: Science demonstration lessons are usually practical lessons where demonstration steps or procedures are outlined and then followed, when others are observing and taking notes. Demonstrations can be conducted by the teacher, learners or an expert from a Science related background. Learners can then repeat the same demonstration lesson. In any learner demonstration, supervision is required at all times.

Project: The learners can demonstrate physically their understanding of the outcomes in various activities they have chosen to investigate.

Excursions and field trips: Excursions and field trips are a valuable and positive addition to any Science program. Science teachers should take every opportunity to study and increase their knowledge of local resources and places suitable for excursions. On any excursion, identify safety measures required to ensure learners' safety.

Making models: Models can be used to show a science concept. Models can be working models or built to scale if they are demonstration models.

Collecting and observation: Observing is an open ended activity. Observations may be carried out over a short or long period. Specific or general observations may be made and data collected to be later classified and analysed.

Testing predictions: This involves making a prediction and testing it. Choose a problem you want to investigate, carry out background research on the problem and predict what might happen.

Research using Internet or Library books: Research involves collection of data and analysing them in order to gain new information or knowledge about a

particular subject. Any form of research must be well planned and those who will be involved must be notified well in advance.

Alternate Teaching Approaches

Approach 1: The 5Es

This "5Es" is a constructivist approach based on the idea that learners learn best when they participate in activities that give them opportunities to work things out for themselves. As the names suggests, there are five phases: engage, explore, explain, elaborate and evaluate.

1. Engage

In this phase:
- Teachers engage learners in activities that capture their interests and stimulate curiosity,
- Learners raise questions,
- Teachers verify learners' prior understandings of the topic,
- Learners compare ideas.

2. Explore

In this phase learners undertake hands-on activities where they:
- Experience the phenomenon or concept,
- Explore the questions they have raised, test their ideas and solve problems.

3. Explain

Only after learners have had opportunities to explore, they have opportunities to:
- Compare their ideas with scientific explanations,
- Use scientific terminology,
- Construct explanations that can be justified using information collected.

4. Elaborate

In this phase learners have opportunities to:
- Apply what they have learnt to new contexts,
- Develop a deeper understanding of the problem or phenomenon as they discuss and compare ideas.

5. Evaluate

In this phase learners and the teacher:
- Look for evidence of changes in learners' ideas, beliefs and skills,
- Evaluate what learners know and can do.

Example of the 5Es teaching and learning approach

Phase of teaching and learning approach	Examples of teaching and learning activities	Sample questions
1. Engage Create interest Reveal personal ideas and beliefs	Brainstorming, concept mapping, developing questions, demonstrations, asking open-ended questions.	What do you mean by . . .? Tell me more about . . .? I find that hard to understand: tell me ....? What makes you think . . .? How do you know . . .? How did you find out about that idea?
2. Explore Explore questions and test learner's ideas	Prioritise class questions, group tasks, investigations, test ideas, research.	How are you going to . . .? How will you be able to tell . . .? Is that the question you really want to ask . . .? What will you do when. . .? It might be a good idea to think about.......? How will you know it . . .? What do you need to find out more about . . .? Why are you doing it that way . . .? How will you be sure it is a fair test ....? How did you arrive at that idea . . .?
3. Explain Compare ideas Construct explanations and justify them in terms of observations and data	Reporting, group discussion, gathering information.	What do you think others might think about this . . .? How is that idea different to . . .? Some people say . . . Does that fit with your idea . . .? How did you arrive at that idea . . .? How will you be able to tell . . .?
4. Elaborate Apply concepts and explanations in new contexts	Further practical work, videos, debates, research.	Same as the *explore* phase. How could you verify that . . .? What will happen if . . .?

| 5. Evaluate
Gather evidence of changes in learners' ideas, beliefs and skills | Refining concept maps, responding to open-ended questions, reflection. | How have your ideas changed . . .?
How is that different to . . .?
It seems you are not sure about . . .
Do you have any questions about . . .?
What have you found out?
What else do we need to know . . .?
What else might you do to be really sure of that. . .? |

Approach 2: The interactive approach

The interactive approach involves a teacher-learner partnership in which the learner and the teacher discuss and cooperate in selecting the topic. The learners are active participants and this helps improve their understanding about familiar and unfamiliar concepts as well as their learning processes.

There are five phases in this approach: preparation, exploration, learners' questions, investigations and reflection.

1. Preparation

In this initial phase, teachers:
- Select the topics jointly with learners
- Verify learners' prior understandings of the topic
- Assemble background information.

2. Exploration

In this phase, learners:
- Clarify the topic and focus their thinking on particular aspects of the topic
- Participate in an activity, preferably hands-on, that enables them to become more familiar with the topic.

3. Learners' Questions

In this phase, learners explore the topic and pose further questions for investigation.

4. Investigations

In this phase, learners and the teacher:
- Select questions to investigate
- Plan and carry out investigations to finalise their answers to the selected questions.

5. Reflection

In this phase, learners have opportunities to:
- Compare their views on the topic before and after exploration, questioning and investigation
- Reflect on what has been determined and what needs further exploration.

Example of the interactive teaching and learning approach

At every step of this approach, there must be a constant interaction and consultation between the teacher and the learner.

Name: **Class:**

Key Competence

1. Preparation Phase

Topic:

What do I know about this topic?

What background information do I need?

2. Exploration Phase

What are some of the things that I am expected to do in this topic?

What are some of the problems I am expected to come across while trying to understand this topic?

How will I explain these to my teacher: as a report, demonstration, role play or oral report?

3. Learners' Questions Phase

Are there other questions that I should ask my teacher about?

Are there any other questions I will need to explore?

4. Investigations Phase

The following are my findings during and after the investigations

5. Reflection Phase

The following are my views before and after the exploration.

Approach 3: Predict, observe and explain

This approach is based on learners drawing on their own experiences to make predictions. There are three phases in this approach: predict, observe and explain.

1. Predict

In this phase:

- Teachers pose the question and allow time for learners to think about and clarify the question,
- Learners make a prediction and give reasons for their prediction,
- Teachers and learners accept all predictions without judgement,
- Learners may change their minds as they share their predictions and reasons.

2. Observe

In this phase, teachers or learners perform relevant activities, either as a class demonstration, in a group or individually, and learners record their observations.

3. Explain

In this phase, learners attempt to explain their observations which may conflict with their original prediction. Teachers encourage learners to reflect on their predictions and modify them to better fit the observations.

Example of the predict, observe, explain teaching and learning approach.

Demonstration	Sample Format
- You have been provided with: - Balloons - Plastic cups (2) - Blow up a balloon a little way and then have your partner firmly hold two plastic cups against opposite sides of the balloon (the open end of the cups come in contact with the balloon) **Now WAIT!** - Predict what will happen when you fully inflate the balloon and your partner lets go of the cups. Record your predictions and write your reasons for this prediction before you carry out the investigation. **Now PROCEED!** - Fully inflate the balloon and let go of the cups. Observe what happens. - Explain what was observed and your predictions and try to find a solution to any difference between your prediction and observation.	Prediction _____ _____ _____ Reasons for prediction _____ _____ _____ Observation _____ _____ _____ A solution to your prediction and observation, if necessary.

Assessment

Assessment is the process of evaluating the teaching and learning processes through collecting and interpreting evidence of individual learner's progress in learning and to make a judgment about a learner's achievements measured against defined standards. Assessment is an integral part of the teaching learning processes. In the new competence-based curriculum assessment must also be competence-based; whereby a learner is given a complex situation related to his/her everyday life and asked to try to overcome the situation by applying what he/she learned.

Types of assessment

Formative and continuous assessment (assessment for learning)

Continuous assessment involves formal and informal methods used by schools to check whether learning is taking place. When a teacher is planning his/her lesson, he/she should establish criteria for performance and behaviour changes at the beginning of a unit. Then at the end of every unit, the teacher should ensure that all the learners have mastered the stated key unit competencies basing on the criteria stated, before going to the next unit. The teacher will assess how well each learner masters both subject and generic competencies described in the syllabus and from this, the teacher will gain a picture of the all-round progress of the learner.

Summative assessment (assessment of learning)

When assessment is used to record a judgment of a competence or performance of the learner, it serves a summative purpose. Summative assessment gives a picture of a learner's competence or progress at any specific moment. The main purpose of summative assessment is to evaluate whether learning objectives have been achieved and to use the results for the ranking or grading of learners, for deciding on progression, for selection into the next level of education and for certification. This assessment should have an integrative aspect whereby a learner must be able to show mastery of all competencies.

Teacher's role in assessment is:

- To develop and implement effective school assessment and reporting practices within school assessment and reporting programs,
- To discuss with learners the assessment, recording and reporting procedures that meet the learning needs of individuals and groups of learners, develop learners' knowledge, skills and understanding of effective assessment and reporting methods,
- To maintain and share relevant records of learners' progress while maintaining confidentiality where appropriate,
- To plan tasks and activities which provide sufficient evidence to show that particular competency has been mastered by the learner,
- To report learners' progress and achievements to learners, parents, guardians, teachers and others,
- To use assessment information to inform and enhance their teaching and learning practices,
- To make valid reports on learners' achievement of outcomes, attitudes and values using the appropriate reporting or certification systems.

Assessment and recording methods

Assessment methods are ways that teachers can collect information about learners' learning. Teachers record evidence of learners' learning and use it to make judgements about learners' achievement of the learning objectives. To ensure that assessment is fair and balanced, teachers should use a range of assessment methods including:

Observation

Teachers can gather much information about learners' learning by observing them in both formal and informal situations inside and outside the classroom. Observation is used largely for assessing skills and so is best suited to assess skills-based activities. It can also be used to assess learners' knowledge and attitudes when they are expressed orally.

Formal assessment tasks that use observation as the assessment method might include:

- Oral presentations,
- Role plays, dramatisations,
- Group work,
- Practical activities.

Informal observations can occur when learners work on normal learning activities both inside and outside the classroom. It is useful to inform learners that you are assessing them and to make sure they know the assessment criteria that you want them to demonstrate. In this way more learners are likely to be successful.

Learners can also observe and give constructive feedback on each other's performances using the same assessment criteria. This is called peer assessment.

Ways of recording observations

There are a number of manageable ways to record observations of learners' achievements. These include:

- Checklists with comments,
- Class grids that allow the teacher to date their observations and focus on a few learners at a time until they have recorded information about all learners. These grids can be used to repeat the observations a number of times to build a fuller picture of each learner's learning having a page for each learner in an exercise book to keep dated, anecdotal records of significant learning,
- Having learners complete peer assessments that show the performance of other learners, either as individuals or in groups, against the assessment criteria.

Sometimes it may be necessary for the teacher to talk to the learners about what they are observing as it is possible to misinterpret information. For example, a learner staring out the window during a writing activity may be seen to be wasting time. When questioned, the learner may well respond with a comment such as, 'I was thinking what to write next,' or, 'I was translati in conferences can be recorded on class grids or in exercise books with a page for each learner.

Analysing learners' products

This is probably one of the most common forms of assessment. The teacher sets an assessment task for learners, explains the assessment criteria to them and then collects the learners' products to see how well they have met the criteria.

Examples of products learners make might include:
- Written work such as stories, big books and posters,
- Models,
- Drawings, maps and diagrams,
- Art and craft samples,
- Community surveys and projects.

Teachers will need to make sure that the assessment criteria match the knowledge, skills and attitudes outlined in the learning objectives being assessed. They will then have to decide how well the learners have met these criteria. Teachers can use different scales to show various levels of achievement. For example, you could use scales like those below:

Examples of scales to show how well learners performed on assessment tasks

Example 1	Example 2	Example 3
F. Learner fully demonstrated the criteria	**3** Learner met the criteria most of the time	**3** Learner met the criteria independently
P. Learner partly demonstrated the criteria	**2** Learner met the criteria some of the time	**2** Learner met the criteria with some assistance
NMP Learner needs more practice	**1** Learner did not meet the criteria	**1** Learner needs more practice

Teachers would record an F for those learners who fully demonstrated the criteria, a P for those who partly demonstrated the criteria and NMP for those learners who need more practice.

Examples 2 and 3 use numbers as codes to show how well the learners met the assessment criteria. Teachers can choose which codes are the easiest for them to understand and use. Examples of how these codes can be used for recording, appear in the section Units of Work.

Ways of recording information gained from analysing learners' products

Teachers may keep written products or records of learners' achievements on

particular assessment tasks in learner's portfolios.

Tests

Tests are used mainly to assess learners' knowledge and understanding of subject content. Tests should be used for both formative and summative assessment, so that results can be used to help learners improve in areas where they are having difficulty.

Tests are just one form of assessment and should be used in conjunction with the other assessment methods. This balanced approach to assessment gives learners a greater chance of being successful as they are able to demonstrate their learning in different ways.

Ways of recording test results

Teachers normally record results of tests in record books. That can be done if the marks mean something and relate to the learning objectives. For example, if a test was out of 10, then those learners who received marks:

- Between 8 and 10 would have demonstrated a good understanding of the competence being assessed,
- Between 5 and 7 would have demonstrated partial understanding of the competency being assessed,
- Of 4 or less, would need more practice or further instruction.

Teachers can also store learners' tests with teacher comments in learners' portfolios.

What to do with assessment information

Once teachers have gathered information from a number of assessment tasks they should be in a position to make decisions about which competences learners have mastered.

Teachers need to look at all the evidence they have gathered about each learner and decide if they have enough evidence to say that the learner has mastered the competency. Normally to make this decision, teachers must be sure that the learners have demonstrated the outcome independently and on a number of occasions; sometimes informally and sometimes in assessment tasks. Teachers can

then record which learners have mastered which competences or skills.

Assessment and recording methods

Assessment method	Examples	Sample recording methods
Observations	- watching work in progress - informal observations - self and peer assessment - role-plays - demonstrations - performances - debates - case studies	- checklists - running record sheets - focused analysis sheet - note taking - anecdotal records Teacher or learners' notebook
Conferencing or talking to learners	- Asking questions - Pre and post interviews - Structured and informal conferences with learners, parents, peers and community - Peer and group discussions	Notes recorded at parent, teacher interviews
Analysing learners' products	- Concept map - Word wall - Diaries and journals - Best work collection - Ffirst and final drafts of writing - Exhibition - Explanations - Assignments - Research and field study reports - Posters and displays	- Learners' profile - Running record sheets - Evaluation sheets Learners' portfolios show a collection of learners' work gathered over time.
Tests	- Essays - Multiple choice - Short answer - Selected response - Close paragraphs	Tests can be stored in Learners' portfolios.

Reporting to parents

The wider range of learning in the new curriculum means that it is necessary to think again about how to share learners' progress with parents. A single mark

is not sufficient to convey the different expectations of learning which are in the learning objectives. The most helpful reporting is to share what learners are doing well and where they need to improve.

While reporting on a learner's demonstration of learning outcomes:
- There should be no reference made to the performance of other learners,
- The teacher should only report that the learning objectives have been achieved, when the learners have demonstrated the result consistently, to a high standard and in a range of contexts,
- The teacher needs to base the report on evidence gathered from a variety of assessment methods.

The information given to the learners must be clear, accurate and fair so that all concerned can help learners to improve their standard of achievements.

Some forms of reporting include:

• Written report cards,

• Record cards,

• Certificates from both internal and external assessment.

Lesson Planning

Lesson planning is a vital component of the teaching-learning process. Proper classroom planning will keep the teachers organized and on track while teaching, thus allowing them to teach more and help learners reach objectives more easily. The better prepared the teacher is, the more likely she/he will be able to handle whatever unexpectedly happens in the lesson.

The subject teacher is best placed to write a lesson plan, taking into account the learners' ability and experience. Help is given here in the form of suggestions: these should assist you to write your own plans in the format required by the management of your school. A sample lesson plan is shown in unit 1 for your reference.

CONTENT MAP

	Unit 1: Agricultural Tools	Unit 2: Objects Production	Unit 3: Computer My Friend
No of periods	10	14	16
Introduction	• The common agricultural tools used in agriculture • Proper use of agricultural tools and their maintenance • Dangers of the misuse of agricultural tools and precaution	• Basic concepts of making toys in clay and wires • Making objects in sticks and banana fibres • Maintenance of utility and learning objects	• Common ICT terms used in ICT field • Sugar Interface • Gnome Interface • Saving, opening renaming, etc., in a journal
Classroom Organisation	Whole class orientation, field visit, group discussion and group work	Whole class orientation, then group work	Practical exercises, Individual work and group work
Equipment Required	Range of agriculture tools, e.g., hoe, spade, rake, axe, wheelbarrow, machete, watering can, trowel, milking can, spraying pump, boots and gloves	Clay, wires, fibres, knife/razor-blade, needle or lancelet, wood, sisal, sticks, manila paper and scissors	XO laptop, computer, Flash disk, SD card, CDs, books, notebook, pen, blackboard and chalk.
Activities	Group discussion, field visit and group work	Brainstorming, practical group work, project work and group discussion	Practical work, lab activity and group work
Competences Practised	• Basic • Research • Creativity • Communication	• Basic • Research • Creativity • Communication	• Basic • Research • Creativity • Communication
Study Skills	Observing, drawing, identifying, and grouping various tools, applying techniques	Selecting materials, making toys	Differentiating, manipulating, practising and performing task

Revision	Revision exercises provided	Revision exercises provided	Revision exercises provided
Assessments	• Observation of oral presentations and group activities • Talking to learners during practical lessons • Tests	• Observation of oral presentations and group activities • Talking to learners during practical lessons • Tests	• Observation of oral presentations and group activities • Talking to learners during practical lessons • Tests
Learning Outcomes	• Using agricultural tools properly • Maintaining the agricultural tools • Storing agricultural tools in proper place • Dangers of the misuse of agricultural tools	• Making bicycles, dolls, animals, motorcycles • Making utility and learning objects • Maintenance of learning and utility objects	• Knowing basic ICT terms used in ICT • Knowing common components of ICT • Differentiating Sugar and Gnome interface • Applying file management in journal

	Unit 4: Writing Skills	Unit 5: Graphics and Multimedia	Unit 6: Programming for Children
No. of Periods	8	5	20
Introduction	• Basic concept of text formatting • Selection of the text • Basics of keyboard and touchpad	• Basic concepts of paint application • Proper uses of drawing tools	• Basics of turtle art window • Identification of the components of scratch window and animation
Classroom Organisation	Practical work and group work	Practical work and whole class orientation	Whole class orientation and group work
Equipment Required	XO laptop, books, notebook, pen, blackboard and chalk	XO laptop	XO laptop, blackboard and chalk
Activities	Practical work, group work and individual work	Practical work and lab activities	Practical work and lab activities and then group work

Competences Practised	• Basic • Research • Creativity • Communication	• Basic • Research • Creativity • Communication	• Basic • Research • Creativity • Communication
Study Skills	Writing, constructing and performing	Evaluating, identifying and analysing	Constructing, observing, practising, creating and animating
Revision	Revision exercises provided	Revision exercises provided	Revision exercises provided
Assessments	• Observation of oral presentations and group activities • Talking to learners during practical lessons • Tests	• Observation of oral presentations and group activities • Talking to learners during practical lessons • Tests	• Observation of oral presentations and group activities • Talking to learners during practical lessons • Tests
Learning Outcomes	• Basics of formatting the text • Selecting the text in the computer appropriately • Using keyboard and touchpad properly	• Explaining the role of paint application • Using Paint Activity to draw, colour and design different shapes	• Designing and constructing geometrical shapes in Turtle Art activity. • Creating animations using Scratch activity

	Unit 7: Air, Wind and Sound	Unit 8: Soil	Unit 9: Animals
No. of Periods	14	12	12
Introduction	• Basic concept of air, its properties and uses • Types of wind, dangers of wind, preventing dangers of wind • Production and propagation of sound, noise and echo	• Definition of soil and its type • Composition of soil and its uses • Soil erosion its agent, causes, types and prevention	• Classification of animals according to their backbones • Classification of animals based on how they move, feed, respire and reproduce

Classroom Organisation	Whole class orientation, field trip and group discussion	Whole class orientation and field visit	Whole class orientation and then group work
Equipment Required	Winnower, balloons, seedling and beam balance	Different samples of soil and field out of the school	Variety of animals, container and water
Activities	Practical work, project work, group discussion and role play	Investigation, farm visit and practical work	School visit and role play
Competences Practised	• Basic • Research • Creativity • Communication	• Basic • Research • Creativity • Communication	• Basic • Research • Creativity • Communication
Study Skills	Designing, comparing and analyzing	Recognizing, matching and applying	Displaying, developing and identifying
Revision	Revision exercises provided	Revision exercises provided	Revision exercises provided
Assessments	• Observation of oral presentations and group activities • Talking to learners during practical lessons • Tests	• Observation of oral presentations and group activities • Talking to learners during practical lessons • Tests	• Observation of oral presentations and group activities • Talking to learners during practical lessons • Tests
Learning Outcomes	• Explaining the utility of air components in daily life. • Explaining the danger of the wind and their prevention • Identifying the damaging effects of noise on hearing system.	• Identifying types of soil. • Identifying components of soil. • Explaining uses of soil • Describing characteristics of soil • Identifying methods and techniques of soil erosion.	• Naming major groups of animals • Differentiating external features of animals • Grouping animals according to their backbones. • Describing breathing style of different animals • Developing curiosity and inquisitiveness spirit towards animals

	Unit 10 : Animals Management	Unit 11: Plants	Unit 12: Human Sensory Organs
No. of Periods	12	14	25
Introduction	• Conditions of a good rabbit hutch • Characteristic of a good rabbit hutch • Taking proper care of rabbit health • Importance of rabbit farming	• Conditions necessary for seed germination • Describing different types of germination and its stages • Different types of plants and their uses	• Functional mechanism of sensory organs • Diseases of sense organs and their prevention • Structure, function and maintenance of sensory organs
Classroom Organisation	Whole class orientation and then group work	Whole class orientation, group work and field visit	Whole class orientation and group work
Equipment Required	Rabbits, rabbit hutch, hay, good high fibre pellet, fresh vegetables and clean water	Seeds of maize and beans, transparent plastic pots, water and refrigerator	Lens, wall charts, objects to produce sound or to taste
Activities	Field visit, group discussion, research work and project work	Project work and group discussion	Group research, group discussion, role play and practical work
Competences Practised	• Basic • Research • Creativity • Communication	• Basic • Research • Creativity • Communication	• Basic • Research • Creativity • Communication
Study Skills	Distinguishing, designing and applying	Selecting, designing, drawing, planting and explaining	Drawing, labelling and applying
Revision	Revision exercises provided	Revision exercises provided	Revision exercises provided
Assessments	• Observation of oral presentations and group activities • Talking to learners during practical lessons • Tests	• Observation of oral presentations and group activities • Talking to learners during practical lessons • Tests	• Observation of oral presentations and group activities • Talking to learners during practical lessons • Tests

Learning Outcomes	• Distinguishing a male from a female rabbit. • Evaluating how rabbit farming is useful • Describing common diseases of rabbit • Developing curiosity and inquisitiveness spirit towards animals • Designing a small rabbit keeping project	• Explaining the process of germination • Defining functions of parts of plant • Showing awareness about the importance of plants to the environment and human beings. • Developing positive attitudes towards conservation of plants as part of living things.	• Explaining functional mechanism of sensory organs • Explaining different sensory organs and their functions • Explaining how to maintain hygiene of sensory organs

	Unit 13 Human Skeleton	**Unit 14: Muscles**
No. of Periods	**10**	**8**
Introduction	• Main parts and major bones of the skeleton and how they function • Types of fractures and different types of bone diseases • Hygiene of the human skeleton	• Major groups of muscles • Functions of muscles • Accidents of muscles and their prevention
Classroom Organisation	Whole class orientation and then group work	Whole class orientation and group work
Equipment Required	The human skeleton model, charts, laths, wood, hard cartons, branches and bandages	The human muscles model, wall charts, blackboard and chalk
Activities	Observation, discussion, role play, group research and demonstration	Group discussion and role play

Competences Practised	• Basic • Research • ICT Skills • Creativity • Communication	• Basic • Research • ICT Skills • Creativity • Communication
Study Skills	Drawing, labelling and applying	Applying and choosing
Revision	Revision exercises provided	Revision exercises provided
Assessments	• Observation of oral presentations and group activities • Talking to learners during practical lessons • Tests	• Observation of oral presentations and group activities • Talking to learners during practical lessons • Tests
Learning Outcomes	• Identifying the main parts and major bones of the human skeleton • Explaining the functions of the skeleton • Explaining the hygiene of the human skeleton • Developing good habit to do regular physical exercises and to have a well balanced diet especially eating food rich in calcium	• Developing awareness of the need of keeping healthier muscles • Differentiating the two main groups of muscles • Listing the major groups of voluntary and involuntary muscles of the human body • Identifying the major functions of voluntary muscles • Identifying the accidents of muscles • Explaining the prevention of muscles' accidents • Applying techniques of maintaining tone of muscles

UNIT 1—AGRICULTURAL TOOLS

1.1 LEARNING OBJECTIVES

At the end of this unit, the learners should be able to:

Knowledge and Understanding	Skills	Attitudes and Values
• Identify the commonly used agricultural tools. • Explain the use of agricultural tools. • Explain the potential dangers of the misuse of agricultural tools and how to prevent them.	• Draw and name different agricultural tools. • Group agricultural tools based on their use. • Apply techniques of maintaining agricultural tools. • Apply techniques of storing agricultural tools.	• Display awareness about the proper and safe use of agricultural tools. • Be careful while using agricultural tools. • Show concern about prevention against potential dangers of agricultural tools' misuse.

1.2 CONTENTS

Agricultural tools

Common agricultural tools	Uses of agricultural tools	Maintenance of agricultural tools	Storage of agricultural tools	Dangers of the misuse of agricultural tools	Precautions while using agricultural tools
• Hoe • Spade • Rake • Axe • Trowel • File	• Digging • Watering • Sharpening • Cutting • Transporting	• Sharpening • Oiling • Cleaning • Repairing • Keeping in dry place	• Agricultural tools should be stored in a clean and dry place	• Cutting oneself • Inhalation of poison from agricultural chemicals	• Boots • Gloves • Masks

1.3 INTRODUCTION

This unit introduces the learners to:

- Common agricultural tools,
- The uses of agricultural tools and how to maintain them,
- Storage of agricultural tools for safety,
- Dangers of the misuse of agricultural tools and their prevention.

1.4 TEACHING AIDS

- **Visual:** Images of different agricultural tools.
- **Audio-video:** Video showing use of agricultural tools and other agricultural practices.
- **Vocabulary:** Machines used in agriculture such as tractor, thresher and harvester.

1.5 TEACHER'S TIP

Start the unit by briefing the learners about Agriculture. Agriculture is the growth of plants and animals for human use. Tools used in Agriculture are known as Agricultural tools. These tools are used by farmers to increase crop production. They also help save time and labour. The use of photographs makes learners aware of the range of

tools available. Comment on the appearance of tools and their corresponding usage. Also make learners aware of the proper and safe use of these tools. Discuss the dangers of getting hurt in case of mishandling them. Also tell them the importance of boots, gloves and masks while handling them.

1.6 TEACHING METHODS

- Observing agricultural tools in class, visiting agricultural farms, role playing, group working, and individual working.

1.7 TEACHING AND LEARNING MATERIALS

- Agricultural tools

1.8 LESSON PARTITION

No.	Lesson Title	Contents	Learner's Activities	Number of Periods
1.	Clearing and Digging Agricultural Tools	• Identification of clearing and digging agricultural tools • Use of clearing and digging agricultural tools • Maintenance of clearing and digging agricultural tools • Storage of clearing and digging agricultural tools	• Visiting agriculture farm to observe the use, to manipulate and to maintain clearing and digging agricultural tools	2
2.	Watering and Transplanting Agricultural Tools	• Identification of watering and transplanting agricultural tools • Use of watering and transplanting agricultural tools • Maintenance of transplanting and watering agricultural tools • Storage of transplanting and watering agricultural tools	• Visiting agriculture farm to observe the use, to manipulate and to maintain watering and transplanting agricultural tools	1

(*Contd...*)

3.	Sharpening and Cutting Agricultural Tools	• Identification of sharpening and cutting agricultural tools • Use of sharpening and cutting agricultural tools • Maintenance of sharpening and cutting agricultural tools • Storage of sharpening and cutting agricultural tools	• Visiting agriculture farm to observe the use, to manipulate and to maintain sharpening and cutting agricultural tools	1
4.	Transporting and Milking Agricultural Tools	• Identification of transporting and milking tools • Use of transporting and milking tools • Maintenance of transporting and milking tools • Storage of transporting and milking tools	• Visiting agriculture farm to observe the use, to manipulate and maintain transporting and milking tools	1
5.	Spraying and Cleaning Tools	• Identification of spraying and cleaning tools • Use of spraying and cleaning tools • Maintenance of spraying and cleaning tools • Storage of spraying and cleaning tools	• Visiting agriculture farm to observe the use, to manipulate and maintain spraying and cleaning tools	2
6.	Dangers of the Misuse of Agricultural Tools	• Identification of the possible dangers of misusing agricultural tools.	• Role play about the use of and care for agricultural tools	1

(Contd...)

7.	Precautions while Using Agricultural Tools	• Identification of precautions to be taken while using agricultural tools.	• Group work to discuss prevention against possible dangers of misusing agricultural tools and make presentation of group findings	1
8.	Unit Revision	• Identification of common agricultural tools • Use of common agricultural tools • Maintenance of common agricultural tools • Storage of common agricultural tools • Identification of ways to prevent against possible dangers of misusing agricultural tools. • Identification of precautions to be taken while using agricultural tools	• Answering unit review exercises	1

1.9 SAMPLE COMPETENCE-BASED LESSON PLAN

School Name:.....................................   Teacher's Name:...............................

Term	Date	Subject	Class	Unit No.	Lesson No.	Duration	Class Size
I	12/02/2016	Science and Elementary Technology (SET)	P4	1	1 of 8	80 minutes	36

Type of Special Educational Needs to be catered for in this lesson and number of learners in each category	**Hearing Impairment (3):** Let the learners sit in front of the teacher so that they can hear the lesson clearly. **Visual Impairment (1):** Let the learner sit in a way so that he/she can see the teacher pointing to illustrations and his/her facial expressions and gestures. Arrange for a Braille book if the learner is completely blind.
Unit Title	Agricultural Tools
Key Unit Competence	To be able to use and maintain agricultural tools safely.
Title of the Lesson	Clearing and Digging Agricultural Tools
Instructional Objective	Having agricultural tools, learners will be able to select, use safely and maintain correctly the clearing and digging tools.
Plan for this Class (location: In/Outside)	Outside the classroom
Learning Materials (for all learners)	• Pens and Pupil's book. • Agricultural tools • Braille pupil's books if there are blind pupils in the class. *NB: Teacher will remind the learners with hearing impairment to wear their hearing aids.*
References	• Rwanda National Curriculum, Primary 4 • Science and Elementary Technology (SET) Pupil's book, Primary 4 • SET Teacher's Guide, Primary 4 • Internet and library materials • English dictionary

Timing for Each Step	Description of Teaching and Learning Activity		Generic Competences and Cross-cutting Issues to be Addressed + A Short Explanation
	Teacher leads class to the farm, students observe and practice use of clearing and digging agricultural tools.		
	Teacher's Activities	**Learner's Activities**	
Introduction 10 minutes	• Ask questions which guide to discover career related to sources of food and its relevant materials **Possible questions:** 1. *What is the career of most of Rwandese people?* 2. *Which materials are used in the agricultural career by Rwandese people?* • Announce the new lesson title, i.e., **Clearing and Digging Agricultural Tools**	• Answers to the questions. **Possible answers:** 1. *Most of Rwandese people are farmers.* 2. *Hoe, machete, slasher, axe, spade, wheelbarrow, spraying pump,...*	**(a) Competences** **Critical thinking:** Learner will think about different careers and establish comparison regarding to the number of people in each career to find out the career in which most Rwandan people are involved in.
Development of the Lesson 60 minutes	• Lead learners to the nearest farm. • Split class into groups of six. • Ask questions related to the ongoing farm activities. **Possible questions:** 1. *What farmers are doing?* 2. *Group them according to the specific task.*	• Observe the ongoing farm activities. • Answer the questions and present their findings **Possible answers:** 1. *Farmers are preparing land.* 2. *Two groups*: *first group is clearing land, the second is digging land.*	**Critical thinking** In the environment, learners observe and compare the different ongoing activities. **Communication:** The working group of classmates provides an open environment to group members which facilitate communication.

(Contd...)

	3. *Name the material that is being used by each working group.* 4. *Ask them to discuss in their groups on how to use and maintain a hoe or a machete.*	3. *The first group is using machetes to cut grasses and bushes, and the second is using hoes to dig land.* 4. *Discussion on how to use hoe/ machete and presentation of findings* *Possible use:* *Hoe is used with two hands but machete is used with* *one arm/ hand.*	**b. Cross-cutting Issues:** **Peace and values:** When using digging and clearing agricultural tools, attention is needed in order to prevent accidents to each other.
	5. *Ask them group by group to practice carefully and correctly the use of hoe, slasher and machete as well as maintaining them.*	5. *Under supervision of teacher and farmer, prepare land using machete and hoe. Then maintain and store the tools.*	

(*Contd...*)

Conclusion and Lesson Assessment 10 minutes	Summary		
	• Ask the learners what they have learned in today's lesson and also what they have learned from each other.	• Learners summarise what they have learned in today's class. Some learners also present what they learnt from their fellow learners during the lesson.	
	Assessment		
	• Ask questions to review common agricultural tools for clearing and digging, their use and maintenance.	• Answers to the questions.	
	Possible questions:	**Possible answers:**	
	1. *Which Rwandan common agricultural tools are used for clearing and digging?*	1. a. *Digging*: *hoe* b. *Clearing*: *machete and slasher.*	
	2. *How to safely use a hoe, slasher and machete?*	2. *Hoe*: *Always used with two arms/hands.* *Machete, and slasher*: *Used with one arm /hand.*	
	3. *How to maintain hoe, machete and slasher?*	3. *After use they are cleaned and kept at a dry place.*	
Teacher's Self-evaluation	• Were all the learners able to select, use safely and maintain correctly the clearing and digging tools*?* • Were all the SEN learners able to select, use safely and maintain correctly the clearing and digging tools? • Any changes needed in teaching approach?		

1.10 TEACHING METHODOLOGY AND LEARNER'S ACTIVITIES

Lesson 1: Clearing and Digging Agricultural Tools

- The teacher should lead the class to the nearest agricultural farm.
- He/She should split the learners into groups of six and ask them to observe and compare the different ongoing farm activities.

- He/She should ask the learners to observe various tools available in the farm.
- For the identification, uses, maintenance and storage of clearing and digging agricultural tools the teacher should guide the learners to carry out **activities 1 to 4** of the Pupil's book.

Lesson 2: Watering and Transplanting Agricultural Tools

- The teacher should lead the class to the nearest agricultural farm.
- He/She should ask learners to observe various tools available in the farm.
- For the identification, uses, maintenance and storage of watering and transplanting agricultural tools the teacher should guide the learners to carry out **activities 1 to 4** of the Pupil's book.

Lesson 3: Sharpening and Cutting Agricultural Tools

- The teacher should lead the class to the nearest agricultural farm.
- He/She should ask the learners to observe various tools available in the farm.
- For the identification, uses, maintenance and storage of sharpening and cutting agricultural tools, the teacher should guide the learners to carry out **activities 1 to 4** of the Pupil's book.

Lesson 4: Transporting and Milking Agricultural Tools

- The teacher should lead the class to the nearest agricultural farm.
- He/She should ask the learners to observe various tools available in the farm.
- For the identification, uses, maintenance and storage of transporting and milking agricultural tools, the teacher should guide the learners to carry out **activities 1 to 4** of the Pupil's book.

Lesson 5: Spraying and Cleaning Agricultural Tools

- The teacher should lead the class to the nearest agricultural farm.
- He/she should ask learners to observe various tools available in the farm.
- For the identification, uses, maintenance and storage of spraying and cleaning agricultural tools, the teacher should guide the learners to carry out **activities 1 to 4** of the Pupil's book.

Activity 1: Identifying and Naming Agricultural Tools

- The teacher should ask the learners to identify and name the different agricultural tools from the picture given in the Pupil's book.

Activity 2: Grouping Agricultural Tools Based on their Uses

- Lead the learners to the nearest farm.
- Split class into groups of six.

- Ask questions related to the ongoing farm activities.
    1. Identify the tools the farm workers use.
    2. Group these tools according to their uses in the table given in the Pupil's book.
- The teacher should guide the learners to observe Table 1.1 given in the pupil's book and help them to learn the names and uses of these tools.
- He/She should ask question to the learners:
- Can you name some other agricultural tools?

Activity 3: Practicing the Maintenance of Agricultural Tools

Step 1: The teacher should take the class to a nearby agricultural farm.

Step 2: He/She should ask the learners to observe the ways people maintain all agricultural tools.

Step 3: He/She should ask them to make a report on it and present to the class.

- After completion of activity, the teacher should discuss with the learners the useful methods to maintain agricultural tools as given in the Pupil's book.

Activity 4: Storing Agricultural Tools

Step 1: The teacher should take the class to a nearby agricultural farm.

Step 2: He/She should ask the learners to observe the techniques which the farm workers use to store their agricultural tools.

Step 3: He/She should ask them to make a report on it and present to the class.

- After completion of activity, the teacher should discuss with the learners the important points that should be kept in mind while storing tools as given in the Pupil's book.

Lesson 6: Dangers of the Misuse of Agricultural Tools

- The teacher should teach the learners how to protect the agricultural tools against possible dangers of misuse.

Activity 5: Discussion on Dangers of Misuse of Agricultural Tools

Step 1: The teacher should ask the learners to discuss the prevention against possible dangers of misusing agricultural tools.

Step 2: He/She should ask them to make a report on it and present to their science teacher.

- After completion of activity, the teacher should discuss with the learners the dangers of misuse of agricultural tools as given in the Pupil's book.

Lesson 7: Precautions while Using Agricultural Tools

The teacher should guide the learners to carry out **Activity 6** given in the Pupil's book.

Activity 6: Discussion on Precautions while Using Agricultural Tools

Step 1: The teacher should take the class to a nearby agricultural farm.

Step 2: He/She should ask the learners to observe the ways the farm workers handle the tools.

Step 3: He/She should ask them to list the precautions to be taken while using the tools.

After completion of activity, the teacher should discuss with the learners the precautions that should be taken while using agricultural tools as given in the Pupil's book.

Lesson 8: Unit Revision

The teacher should ask questions from the unit review exercises covering all the lessons to assess the competences achieved by the learners.

1.11 ADDITIONAL CONTENT FOR THE TEACHER

The following are some additional learner-centred activities which the teacher can use to help develop learners' competences or to assess the competence level achieved by the learners.

Activity A-1

There is plate of tools. Ask the learners to identify the agricultural tools and label them.

Activity A-2

The teacher can divide class into groups of ten learners each. Then, he/she will distribute each group a set of flashcards on agricultural tools. Let them observe and identify each tool. Now, he/she will ask them to write their names in their notebooks.

1.12 WEB LINKS FOR CONTENT ENRICHMENT
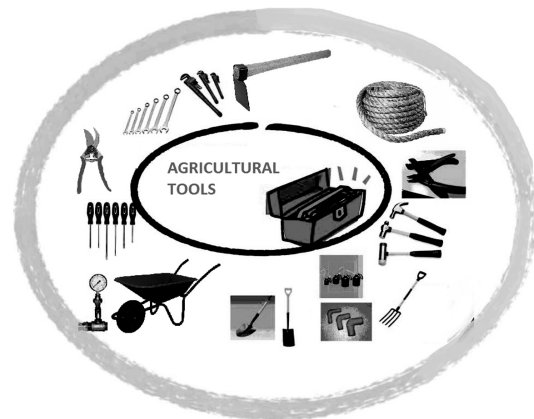
- http://www.fao.org/docrep/x5672e/x5672e0a.htm
- http://etc.usf.edu/clipart/galleries/206-agricultural-tools
- http://en.wikipedia.org/wiki/List_of_agricultural_machinery

1.13 ANSWERS TO ACTIVITIES

Activity 1

(i)	Axe	(ii)	Spraying pump	(iii)	Hoe
(iv)	Wheelbarrow	(v)	Milking can	(vi)	File
(vii)	Watering can	(viii)	Machete	(ix)	Rake
(x)	Trowel	(xi)	Spade	(xii)	Pickaxe

Activity 2

Digging tools	Watering tools	Transplanting tools	Sharpening tools	Cutting tools	Transporting tools	Cleaning tools	Spraying tools
Hoe	Watering	Trowel	File	Axe	Wheelbarrow	Rake	Spraying
Pickaxe	can	Spade		Machete	Milking can		pump

1.14 SOLUTIONS TO UNIT REVIEW EXERCISES

I. Fill in the blanks with the correct options:

1. (a)   **2.** (a)   **3.** (b)   **4.** (b)   **5.** (c)

II. State whether the following statements are true or false:

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

III. Match the following:

1. (c)   **2.** (d)   **3.** (e)   **4.** (b)   **5.** (a)

IV. Answer the following questions briefly:

1. The tools we use in farming are called agricultural tools.

2. Some common agricultural tools are hoe, spade, rake, axe, wheelbarrow, watering can and trowel.

3. (a) Uses of hoe

    (i) Digging the soil   (ii) Removing weeds

    (iii) Making drains   (iv) Harvesting crops liks maize, sugarcane, cassava and yam

(b) Uses of rake

    (i) Collecting fallen leaves, hay and grass

    (ii) Levelling the soil

    (iii) Making seedbeds

(c) Uses of spraying pump

    (i) Spraying liquid fertilisers

    (ii) Spraying pesticides, herbicides and weedicides

(d) Uses of trowel
   (i)   Transplanting of seedlings
   (ii) Digging holes for planting seeds
   (iii) Application of fertilisers and manure to the soil.
(e) Uses of machete
   (i)   Clearing of bushes
   (ii) Harvesting crops like maize and sugarcane

4. The following are some useful methods to maintain agricultural tools in good condition:
   (a) Tools must be cleaned properly after use.
   (b) After cleaning, tools must be stored in a safe, dry and termite-free place.
   (c) Digging and cutting tools should be kept sharp.
   (d) Plastic sprayers must be kept away from fire. Pipes and nozzles must be cleaned regularly to prevent blockages.
   (e) Damaged tools must be repaired properly. Their parts must be replaced, if they are not in working condition.
   (f) Metallic tools such as watering cans and wheelbarrows must be painted regularly to avoid rusting.
   (g) On transporting tools and their parts, oiling and greasing must be done regularly.
   (h) Tools must be handled with care.
   (i) Tools must be used for the purpose they are designed.
   (j) Records of the movement of tools must be kept.

5. Misuse of agricultural tools could lead to injuries to people and their co-workers. Incorrect storage of tools could also lead to injuries. We may get cut with the sharp edges of the tools. Therefore, tools must be handled with care.

   If an agrochemical is inhaled as a mist, it may cause headache, nausea and diseases of lungs. So it is necessary to wear a mask during the spraying of pesticides. Ensure that there is nobody around while spraying.

V. **Complete the crossword puzzle using the clues below:**

Across	Down
2. Spraying pump	**1.** Milking can
4. Trowel	**3.** Machete
5. Wheelbarrow	

1.15 ASSESSMENT METHODS

Use observation technique, question answer technique, and demonstration technique to assess the learners achievement of learning objectives.

1.16 ASSESSMENT

1. .... is a double headed thick metal blade with a wooden handle. (Hoe/Pickaxe)
2. Hoe is a digging tool. (True/False)
3. Which tool is used to break the hard soil?
4. How does a trowel help in agriculture?
5. Name a tool which looks like a big knife.
6. Which tool is used for spraying liquid fertilisers?
7. Write the structure of milking can.
8. What are the dangers of the misuse of agricultural tools?

Answers

1. Pickaxe
2. True
3. Pickaxe is used to break the hard soil.
4. Trowel is used to apply fertilisers and manure to the soil. It also helps in digging holes for planting seeds.
5. Machete
6. Spraying pump
7. Milking can is a metal container with a handle.
8. Misuse of agricultural tools could lead to injuries to people and their co-workers.

UNIT 2—OBJECTS PRODUCTION

2.1 LEARNING OBJECTIVES

At the end of this unit, the learners should be able to:

Knowledge and Understanding	Skills	Attitudes and Values
• Identify the most common local materials used in making various objects. • Explain the techniques of making each type of objects based on the materials used. • Explain the maintenance of toys, utility and learning objects produced.	• Select materials by type of objects to make. • Make toys, utility and learning objects using appropriate materials (either clay, sticks or paper). • Display dexterity for safety purpose in making objects.	• Show awareness of the use of local materials to make some useful objects (toys, utility and learning). • Show curiosity and willing to make certain objects with local materials. • Appreciate well-made play, utility and learning objects. • Show concern about the safety both in making and keeping objects.

2.2 CONTENTS

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                          ┌──────────────┐
                          │   Objects    │
                          │  Production  │
                          └──────────────┘
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Making toys in clays and wires	Making utility objects in stick	Making utility objects in banana fibres	Making learning materials in paper	Maintenance of utility and learning materials
• Bicycles • Dolls • Animals • Motorcycles	• Basket	• Dustbin • Mat	• Triangle • Rectangle • Square	• Storing in a clean, cool and dry place
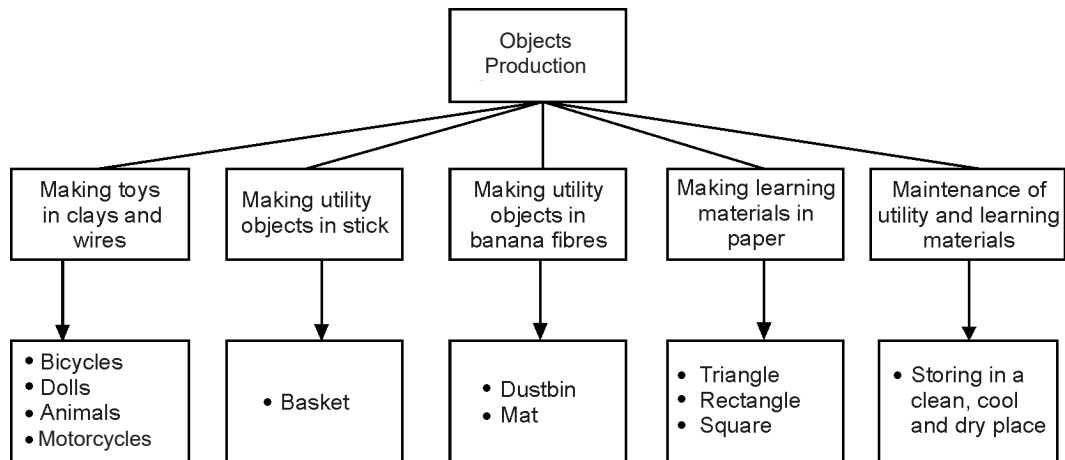
2.3 INTRODUCTION

- This unit introduces the learners with how to make toys in clays and wires such as bicycles, dolls, animals and motorcycles.

- This unit also introduces the learners with making utility objects in sticks. After completion of this unit, the learners are expected to be able to know how to make utility objects in banana fibres, learning materials in paper and how to maintain utility and learning objects.

2.4 TEACHING AIDS

- **Visual:** Original or images of different toys and utility objects.
- **Powerpoint Presentation:** How to make toys and useful objects from clay, sticks and banana fibres.
- **Audio-video:** Video showing proper handling of knife, needle, razor, blade and scissors.

2.5 TEACHER'S TIP

Start the unit by explaining to the learners about useful objects. Useful objects may include toys, utility products and objects used for learning. There are many products like clay, sticks and paper which are easily available. These can be used to make different utility and learning objects. Involve learners in activities to make some objects out of the waste materials available. This will create curiosity and willingness to learn amongst learners. Make them aware of the products, proper storage in cool, dry and clean place. This would increase the life of the objects.

Also inform them on the methods of handling knife/razor-blade, needle or lancelet, wires and scissors while producing utility and learning objects.

2.6 TEACHING METHODS

Brainstorming, group work, project work, individual work and group discussion.

2.7 TEACHING AND LEARNING MATERIALS

- Clay, wires, fibres, knife/razor-blade, needle or lancelet, wood, sisal, sticks, manila paper and a pair of scissors
- Clay (red and black), wire, sellotape, black thread and glue
- Clay, water and stones
- Clay and knife
- Soft sticks which can be bent, thread
- Straight banana fibre and strings
- Paper

2.8 LESSON PARTITION

No.	Lesson Title	Contents	Learner's Activities	Number of Periods
1.	Making Toy Bicycle and Doll	• Identification of common local materials that can be used to make toy bicycle and doll. • Making toy bicycle and doll in clay and wires.	• Brainstorming to identify the most common local materials that can be used to make toy bicycle and doll. • Group work to collect clay and wires to make toy bicycle and doll. • Making and then displaying the objects in the classroom.	2

(*Contd...*)

2.	Making Toy Cat and Motorcycle	• Identification of common local materials that can be used to make toy cat and motorcycle. • Making toy cat and motorcycle in clay.	• Brainstorming to identify the most common local materials that can be used to make toy cat and motorcycle. • Group work to collect clay. • Making and then displaying the objects produced in the classroom.	2
3.	Making Basket (A utility object)	• Identification of common local materials that can be used to make basket. • Making basket using sticks.	• Brainstorming to identify the most common local materials that can be used to make a basket. • Group work to collect sticks to make basket. • Making and then displaying the baskets produced in the classroom.	2
4.	Making Dustbin and Mat (Utility objects)	• Identification of common local materials that can be used to make a dustbin and a mat. • Making dustbin and mat using banana fibres.	• Brainstorming to identify the most common local materials that can be used to make a dustbin and a mat. • Group work to collect banana fibres to make a dustbin and a mat. • Making and then displaying the dustbin and mat produced in the classroom.	3

5.	Making Learning Materials	• Identification of common local materials that can be used to make learning materials such as shapes of triangle, rectangle and square. • Making shapes of triangle, rectangle and square using sheets of paper.	• Brainstorming to identify the most common local materials that can be used to make learning materials such as shapes of triangle, rectangle and square. • Group work to collect sheets of paper to make the learning materials. • Making and then displaying the shapes of triangle, rectangle and square in the classroom.	3
6.	Maintenance of Toys, Utilities and Learning Objects	• Explanation of the maintenance of toys, utilities and learning objects produced.	• Discussion in small groups about the maintenance of various objects produced.	1
7.	Unit Revision	• Identification of common local materials that can be used to make various objects. • Making toys, utilities and learning objects using appropriate materials. • Maintenance of the objects produced.	• Answering unit review exercises.	1

2.9 TEACHING METHODOLOGY AND LEARNER'S ACTIVITIES

Lesson 1: Making Toy Bicycle and Doll

- The teacher should begin the lesson by asking the learners which local materials can be used to make toys.
- He/She should guide the learners to read the text given in **Activities 1–3** given in the Pupil's book and make a toy bicycle and a doll.

Activity 1: Making a Toy Bicycle from Wire

Step 1: The teacher should arrange a soft aluminum wire and a wire cutter.

Step 2: He/She should help the learners to make a toy bicycle as per the procedure given in the Pupil's book.

Activity 2: Making a Clay Doll

Step 1: The teacher should ask the learners to collect some clay and knead it.

Step 2: He/She should guide them to make a doll using clay as per the procedure given in the Pupil's book

Activity 3: Making a Wire Doll

Step 1: The teacher should ask the learners to collect a soft aluminum wire, a wire cutter and a plier.

Step 2: He/She should ask them to make a wire doll following the procedure given in the Pupil's book.

Lesson 2: Making Toy Cat and Motorcycle

- The teacher should guide the learners to read the text given in **Activities 4** and **5** given in the Pupil's book and make a toy cat and a motorcycle from clay.

Activity 4: Making a Cat from Clay

Step 1: The teacher should ask the learners to collect some clay and knead it.

Step 2: He/She should guide them to make a toy cat using clay following the procedure given in the Pupil's book.

Activity 5: Making a Motorcycle from Clay

Step 1: The teacher should ask the learners to collect some clay and knead it.

Step 2: He/She should guide them to make a toy motorcycle using clay following the procedure given in the Pupil's book.

Lesson 3: Making Basket (A Utility Object)

- The teacher should begin the lesson by asking the learners which local materials can be used to make utility object such as basket.
- The teacher and the learners will discuss and select sticks as the appropriate material for making baskets.
- The teacher should ask the learners to carry out **Activity 6** given in the Pupil's book.

Activity 6: Making a Basket from Sticks

Step 1: The teacher should help the learners to make a basket from sticks as per the procedure given in the Pupil's book.

Step 2: He/She should ask them to display the produced basket in the classroom.

Lesson 4: Making Dustbin and Mat (Utility Objects)

- The teacher should begin the lesson by asking the learners which local materials can be used to make utility object such as dustbin and mat.
- The teacher and the learners will discuss and choose banana fibres as the appropriate material for making dustbin and mat.
- The teacher should ask the learners to obtain banana fibres from a banana plant.
- He/She should guide them to carry out **Activities 7** and **8** given in the Pupil's book.

Activity 7: Making a Mat from Banana Fibre

Step 1: The teacher should ask the learners to make the mat from banana fibres as per the procedure given in the Pupil's book.

Step 2: He/She should ask them to display the produced mat in the classroom.

Activity 8: Making a Dustbin from Banana Fibre

Step 1: The teacher should ask the learners to make the dustbin from banana fibres as per the procedure given in the Pupil's book.

Step 2: He/She should ask them to display the dustbin produced in the classroom.

Lesson 5: Making Learning Materials

- The teacher should ask the learners to make different shapes like triangle, rectangle and square from the sheet of paper.
- He/She should guide the learners to carry out **Activities 9**, **10** and **11** given in the Pupil's book.

Activity 9: Making a Triangle from a Sheet of Paper

Step 1: The teacher should ask all the learners to read **Activity 9** given in the Pupil's book to understand the procedure of making a triangle from a paper.

Step 2: He/She should provide a rectangular sheet of paper and a pair of scissors to each learner and ask them to carry out the activity individually. The pair of scissors may be used one by one in rotation.

Activity 10: Making a Rectangle from a Sheet of Paper

Step 1: The teacher should ask all the learners to read **Activity 10** given in the Pupil's book to understand the procedure of making a rectangle from a paper.

Step 2: He/She should provide a rectangle sheet of paper and a pair of scissors to each learner.

Step 3: He/She should ask the learners to carry out the activity individually. The pair of scissors may be used one by one in rotation.

Activity 11: Making a Square from a Sheet of Paper

Step 1: The teacher should ask all the learners to read **Activity 11** given in the Pupil's book to understand the procedure of making a square from a paper.

Step 2: He/She should provide a rectangular shaped paper and a pair of scissors to each learner and guide them to carry out the activity individually. The pair of scissors may be used one by one in rotation.

Lesson 6: Maintenance of Toys, Utilities and Learning Objects

- The teacher should divide the class into small groups and lead a discussion on the maintenance of the toys, utilities and the learning objects produced.
- He/She should discuss that the objects produced should be kept/stored in a dry, cool and clean place and cleaned with a soft brush.

Practical Activity

- The teacher should ask the learners to collect the materials listed in this activity.
- He/She should ask the learners to prepare toys, utilities and learning objects individually.
- He/She should discuss the maintenance of object produced.

Lesson 7: Unit Revision

- The teacher should ask questions from unit review exercises covering all lessons to assess the competences achieved by the learners.

2.10 ADDITIONAL CONTENT FOR THE TEACHER

The following is an additional learner-centred activity which the teacher can use to help develop learners' competency or to assess the competency level achieved by the learners.

Activity A-1

Aim: Making a clay bird

You will need: clay, water and a toothpick

Procedure:

1. Start with a ball or an egg-shaped lump of clay, modelling it with the palms of the hands.
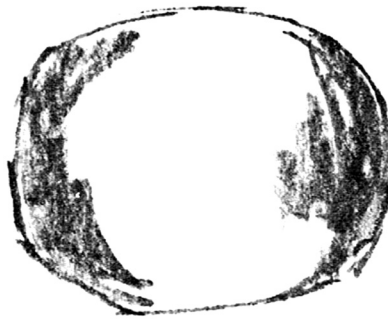
2. Model in a solid mass with no detail.
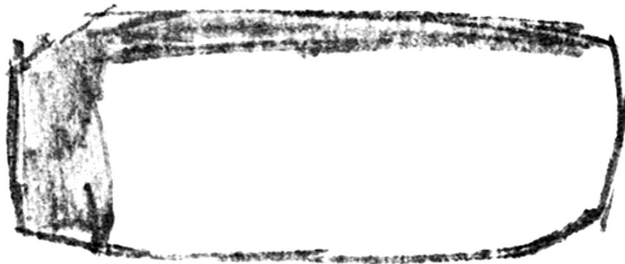
3. Shape the clay into a bird like this.
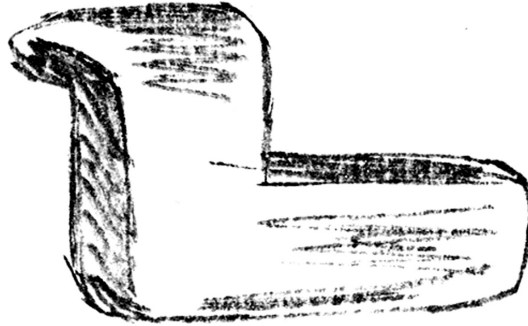
4. Now, make head, wings and tail.

In the same way, the learners can make models of various animals like a dog.

2.11 WEB LINKS FOR CONTENT ENRICHMENT

- http://www.wikihow.com/Make-Clay-Dolls
- https://books.google.co.in/

2.12 SOLUTIONS TO UNIT REVIEW EXERCISES

I. **Answer the following questions briefly:**

   1. Natural clay
   2. Doll, cat and motorcycle
   3. Clay
   4. Ropes, mats, bags and dustbin
   5. (i) Triangle; (ii) Square; (iii) Rectangle

II. **Complete the crossword puzzle using the clues below:**

   Across   **Down**
   2. Object   **1.** Fibre
   4. Square   **3.** Triangle
   5. Rectangle

2.13 ASSESSMENT METHODS

Use observation technique, question answer technique, and demonstration technique to assess the learners' achievement of learning objectives.

2.14 ASSESSMENT

1. Natural clay, water, and …………. are used to make clay doll. (stones/cement)
2. Clay should be kneaded before modelling. (True/False)
3. What are needed to make a motorcycle from clay?
4. Making shapes from a sheet of paper is a culture. (True/False)
5. What care should be taken to keep learning tools safe?

Answers

1. stones
2. True
3. Natural clay and knife
4. False
5. They should be kept at dry and clean place. They should be cleaned with dry soft brush.

UNIT 3—COMPUTER MY FRIEND

3.1 LEARNING OBJECTIVES

At the end of this unit, the learners should be able to:

Knowledge and Understanding	Skills	Attitudes and Values
• Explain the common terms used in ICT. • List the common ICT terminologies. • Identify the elements in Sugar user interface. • Explore different activities. • Switch from Sugar to Gnome interfaces. • Identify and explore elements in Gnome user interface. • Locate name and erase a document in the Journal. • Arrange documents and apply search techniques in the Journal.	• Differentiate and use ICT terms in daily life. • Manipulate with guidance different activities in Sugar interface. • Interact with Sugar user interface to open and close an activity. • Practise to call and send SMS as the means of communication using mobile phones. • Perform deletion and renaming a document. • Produce a document and be able to share it with a friend. • Practise different techniques to search a document. • Copy a document from different locations.	• Appreciate the importance of terms used in ICT. • Understand other perspectives and be aware of new vocabularies in ICT. • Be excited by the design of the Sugar interface. • Be aware of the two user interfaces and their strengths. • Pay attention on how to manage documents in the Journal. • Respond to different ways of searching a document. • Appreciate the process of sending and receiving documents.

3.2 CONTENTS

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                        ┌──────────────┐
                        │  Computer    │
                        │  My Friend   │
                        └──────────────┘
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Common ICT terms used in ICT	Sugar interface	Gnome interface	Use of the journal	Search and retrieve a saved document
• Computer • Data • Information • Communication • Project • Hardware • Software	• Search in home • Favourite view • List view	• Desktop • Panel window • Workspaces	• To save in the journal • To open and close memories • To rename a document	• Classification of journal according to anything • According to anytime • According to sort view

3.3 INTRODUCTION

- This unit introduces the learners to common ICT terms used in ICT such as computer, communication, technology and the Internet.
- This unit informs about Sugar interface.
- This unit informs about Gnome interface.
- This unit informs the learners about the use of Journal such as (i) how to save in the Journal, (ii) how to open and close external memories, (iii) how to rename, erase, and send a document.
- This unit also introduces with searching in Journal by entering the item name in the search key.

3.4 TEACHING AIDS

- **Visual:** Images showing computer, keyboard, mouse, touchpad and XO laptops.
- **Powerpoint Presentation:** Presentation showing how to manage documents and different ways of searching a document.
- **Vocabulary:** New words in ICT for example, interface, printer, plotter, keyboard, shutdown and boot.

3.5 TEACHER'S TIP

- You could start the unit by introducing ICT (Information and Communication Technology) and its vocabulary in the class. Introduce them to the terms like XO laptop, Flash disk, computers, Secure Digital (SD) card and Compact Disks (CDs).

Relate the terms to a practical experience inside the computer laboratory. Introduce computers and its easy handling to the learners. Create an atmosphere of technology inside the classroom. Make the learners aware of the two user interfaces. Tell them that performance, errors, and satisfaction are new part of these interfaces. Introduce the term Journal and its use. Teach them how to manage documents in a Journal. Enable them to search a document in different ways in the Journal. Let them understand the process of sending and receiving a document. Make them practise the process.

3.6 TEACHING METHODS

- Demonstration, group discussion , role play and field visit.

3.7 TEACHING AND LEARNING MATERIALS

- XO laptop, computer, Flash disk, SD card, CDs, books, notebook, pen, blackboard, and chalk.

3.8 LESSON PARTITION

No.	Lesson Title	Contents	Learner's Activities	Number of Periods
1.	Computer	• Definition of computer • Role of a computer • Switching ON a computer • Switching OFF a computer	• Visiting school computer lab to observe the computer, discussing its role and practising switching the computer On and Off.	1
2.	Data and Information	• Definition of data • Definition of information • Typing text from the keyboard	• Visiting school computer lab to practise typing text using the keyboard.	1
3.	Communication	• Definition of communication • Role of communication • Calling and sending messages • Typing a text	• Discussing the meaning of communication and its role. • Calling and sending messages using a mobile phone. • Typing and sending text messages using a mobile phone.	1

(*Contd...*)

4.	Technology	• Definition of Internet • Definition of Website • Definition of www • Typing a domain name in the address bar in the browse activity	• Discussing definition and role of Internet, website and www. • Visiting school computer lab to type domain name of Rwanda Education Board (REB) in the address bar in the browse activity.	2
5.	Activity and Project	• Definition of Activity • Definition of Project • Opening an Activity • Closing an Activity	• Discussing definition of Activity and Project and practising opening and closing an activity.	1
6.	Digital and Analogue Data	• Definition of digital and analogue data	• Discussing definition of digital and analogue data	1
7.	Hardware and Software	• Keyboard • Touchpad • Activities	• Visiting school computer lab to observe the computer hardware and software.	1
8.	Sugar Interface	• Search in home (Display quickly an activity) • Favourite view • List view	• Interacting with Sugar user interface, opening and closing and browse activity in Sugar interface.	2
9.	Gnome Interface	• Desktop (creating folders) • Panel • Window (s), • Workspaces (writing a text) • File manager (searching programs)	• Practising to switch from Sugar to Gnome and vice-versa. • Group discussion on sending documents to each other.	2
10.	The Journal	• Uses of Sugar Journal	• Using removable media • Saving entries from Journal to USB device. • Saving entries from USB devices to journal. • Practicing to copy a document from flash to journal or vice-versa.	2

11.	Searching and Retrieving a Saved Document in the Journal	• By classifying items according to:
		  o anything
		  o anytime
		  o sort view
		• By entering the item name in search key
			• Practising to use different techniques in searching a document from the journal.	1

12.	Unit Revision	• Common ICT terms used in ICT field • Sugar interface • Gnome interface • The Sugar Journal • Search and retrieve a saved document in the Journal	• Answering unit review exercises	1

3.9 TEACHING METHODOLOGY AND LEARNER'S ACTIVITIES

Lesson 1: Computer

- The teacher should guide the learners to define Computer, state its role and practise switching it ON and OFF on their own.

Activity 1: Observing and Listing Different ICT Tools

Step 1: The teacher should arrange to take few learners to the school computer lab.

Step 2: He/She should ask them to observe the equipment and describe all ICT tools found there briefly.

Step 3: He/She should ask them to list those ICT tools not found in the computer lab.

Step 4: He/She should take them back to the classroom and ask them to share the information they got on the ICT tools with classmates.

Step 5: He/She should ask them to discuss the importance of each ICT tool.

Step 6: He/She should also ask them to write the role of the ICT tools in their notebooks.

- The teacher should discuss that computer is one of the ICT tools. Mobile phones, calculators, radios, scanner and fax machines are other common ICT tools. These tools help us use information and share it digitally.
- He/She should discuss the various roles of computer in our daily life as given in the Pupil's book.

Activity 6: Switching ON a Computer

- Ask the learners to study the steps of switching ON a desktop computer and an XO laptop given in the Pupil's book and perform the same.

Activity 7: Switching OFF a Computer
- Ask the learners to study the steps of switching OFF a desktop and an XO laptop given in the Pupil's book and practise the same.

Lesson 2: Data and Information
- The teacher should discuss with the learners the concept of data and information.
- He/She should tell them that typing text from a keyboard is a form of data.
- He/She should lead them to school computer lab to practise typing text using the keyboard.

Lesson 3: Communication
- The teacher should introduce the lesson by discussing that communication is the process of sending or receiving information.
- He/She should discuss that we can communicate by speaking, writing, through art and music and books.

Activity 2: Discussion on the Role of Tools of Communication

Step 1: The teacher should ask the learners to discuss with their parents or guardians the role of tools of communication (telephones, computers, radios, televisions) and how the communication was done before the invention of these tools.

Step 2: He/She should also ask them to take note of the responses received in their notebooks.

Step 3: He/She should ask them to share the information with their classmates.

Calling and Sending Messages Using a Mobile Phone

- The teacher should guide the learners to carry out **Activities 3** and **4** given in the Pupil's book.

Activity 3: Calling and Sending Messages Using Mobile Phones

Calling Using Mobile Phones

Step 1: The teacher should arrange a mobile phone for the activity.

Step 2: He/She should ask the learners to write the receiver's telephone number.

Step 3: He/She should ask them to push the call key.

Sending Message Using Mobile Phones

Step 1: The teacher should ask the learners to open writing option on the mobile phone.

Step 2: He/She should ask them to write a greetings message.

Step 3: He/She should ask them to write a receiver's telephone number.

Step 4: Finally, he/she should ask them to push the send key.

Activity 4: Typing and Sending Text Messages Using Mobile Phone

Step 1: The teacher should help the learners to type a text message from a mobile phone keypad.

Step 2: He/She should ask the learners to send this message to one of their friend and a family member.

- After this activity, the teacher should discuss with the learners the roles communication plays in our day-to-day life as given in the Pupil's book.

Lesson 4: Technology

- The teacher should discuss with the learners, the concept of technology, its role and examples as given in the Pupil's book.

Internet, Website, www

- The teacher should ask the learners to read and define Internet, Website and www. Ask the learners to carry out **Activity 5** given in the Pupil's book.

Activity 5: Typing Domain Name in the Address Bar of the Browse Activity

Step 1: The teacher should take the learners to the computer lab or ask them to use an XO laptop.

Step 2: He/She should ask them to type the domain name of Rwanda Education Board (www.reb.rw) in the address bar in the browse activity.

Lesson 5: Activity and Projects

- The teacher should discuss with the learners the definition of Activity as given in the Pupil's book.

- He/She should discuss with the learners the definition of Project as given in the Pupil's book.

- He/She should discuss with the learners how to open an Activity.
- He/She should discuss with the learners how to close an Activity.

Lesson 6: Digital and Analogue Data

- The teacher should discuss definition of digital and analogue data with the learners giving suitable examples.

Lesson 7: Hardware and Software

- The teacher should ask the learners to read and discuss the definition of computer hardware and software giving suitable examples.

Lesson 8: Sugar Interface

- The teacher should discuss how to start up sugar interface. He/She should also help the learners understand different elements of sugar interface. The learners will perform **Activities 8** and **9** given in the Pupil's book to understand the same.

Activity 8: Switching ON an XO Laptop
Step 1: The teacher should guide the learners to switch ON an XO laptop.
Step 2: He/She should ask them to describe how icons are arranged on Home screen.

Starting up Sugar Interface

- The teacher should ask the learners to carry out **Activity 9** given in the Pupil's book.

Activity 9: Starting up Sugar Interface
- The teacher should guide the learners to start up Sugar Interface both on a personal computer and on an XO laptop as given in the Pupil's book.

Elements of Sugar Interface

- The teacher should discuss and help the learners understand the different elements of Sugar Interface as given in the Pupil's book.

XO Menu

- The teacher should guide the learners to carry out **Activity 10** given in the Pupil's book.

Activity 10: Observing different XO Menu

Step 1: The teacher should ask the learners to switch ON their XO laptop.

Step 2: He/She should ask them to hover over the XO icon in the middle of the ring of activities.

Step 3: He/She should let them write in their notebooks the options which appear on the menu.

The XO menu appears when they point on the XO icon.

Lesson 9: Gnome Interface

- The teacher should help the learners understand how the XO laptop allows switching from Sugar interface to GNOME interface.

Activity 11: Switching to GNOME Interface from Sugar Interface

Step 1: The teacher should ask the learners to hover over the XO icon in the middle of ring of activities.

Step 2: He/She should ask them to choose the option **My Settings**.

Step 3: He/She should ask them to select **Switch Desktop** option under **My Settings** and follow steps until they click on switch to GNOME.

Major Components of Gnome Desktop

- The teacher should discuss with the learners, the major components of Gnome desktop as given in the Pupil's book.

  1. **Desktop basics:** The desktop lies behind all other components on your screen.
  2. **Desktop panels:** The bars across the top and bottom of the desktop are called panels.
  3. **Windows:** It is a rectangular area of an opened application.
  4. **Workspaces:** These allow you to manage which windows are on your screen.
  5. **Applications:** It is a type of computer program that allows you to perform a particular task.

Creating a Folder in GNOME

The teacher should help the learners to perform **Activity 12** given in the Pupil's book. It will help them understand how to create a folder in Gnome.

Activity 12: Creating and Renaming a Folder in GNOME

Step 1: The teacher should ask the learners to switch to Gnome from Sugar.

Step 2: He/She should then ask them to right click on blank area of desktop and the menu appears.

Step 3: He/She should ask them to click on option Create Folder and the folder will be created on the desktop.

Step 4: He/She should then ask them to rename the new folder appeared on the desktop of their choice.

Switching to Sugar from GNOME

- The teacher should help the learners understand that Switching back to Sugar from GNOME can be done by double click on icon "Switch to Sugar" of GNOME Desktop.

Lesson 10: The Journal

- The teacher should discuss with the learners the different uses of Sugar Journal as given in the Pupil's book.

Opening the Journal

- The teacher should demonstrate how to open the journal.

Journal Features

- The teacher should discuss the various Journal features with the learners.
- He/she should discuss with the learners the menu and a list of journal entries contained in the Journal View.

Journal Detail View

- The teacher should discuss with the learners the components of the detail view as given in the Pupil's book.

Using Removable Media

- The teacher will discuss and help the learners to understand the method to work with Journal using removable media. To understand this, ask the learner to perform **Activities 13, 14, 15** and **16** given in the Pupil's book.

Activity 13: Using Removable Media

Step 1: The teacher should ask the learners to plug a flash disk into the XO laptop.

Step 2: He/She should ask them to push on magnifying glass key to open Journal.

Step 3: He/She should ask them to write on the notebook two icons found on the button of Journal.

Step 4: He/She should ask them to open the Universal Serial Bus (USB) device by clicking on the icon representing flash disk on the bottom of the Journal.

Step 5: He/She should ask them to click on Journal icon besides the USB device icon to see the activities saved in Journal.

Activity 14: Saving Entries from Journal to USB Device

Step 1: The teacher should ask the learners to plug USB device into XO laptop.

Step 2: He/She should ask them to open Journal.

Step 3: He/She should ask them to point on the entry they want to move and hold the touchpad key.

Step 4: He/She should ask them to drag down to the USB device icon.

Activity 15: Saving Entries from USB Device to Journal

Step 1: The teacher should ask the learners to plug USB device into an XO laptop.

Step 2: He/She should ask them to open Journal.

Step 3: He/She should ask them to click on USB icon to view its content.

Step 4: He/She should ask them to point on the entry they want to move and hold the touchpad key.

Step 5: He/She should ask them to drag down to the Journal icon.

Activity 16: Sending Documents to Each Other

Step 1: The teacher should ask the learners to read and follow the steps given in the Pupil's book to carry out the activity.

Lesson 11: Searching and Retrieving a Saved Document in the Journal

- Guide the learners to search and retrieve a saved document in the journal using Journal features such as a Search box, by selecting items by type (anything) or filter by date (Anytime).

Lesson 12: Unit Revision

- The teacher should ask questions from the unit review exercises covering all lessons to assess the competences achieved by the learners.

3.10 ADDITIONAL CONTENT FOR THE TEACHER

The following additional content will be helpful for the teacher to introduce working of XO laptop and some shortcut keys used in Sugar Interface to the learners.

Opening an XO Laptop

To open the XO laptop, position the handle away. Lift both antennae up towards you. The laptop clicks open. Lift the screen up from the keyboard.

To open an XO laptop, follow these steps:

1. For handheld mode, lift the "bunny ears."

2. Listen for the laptop clicking open.

To flip an XO laptop, follow these steps:

1. Bring the display up to a 90-degree angle and put the antennae up

2. Rotate the display 180 degrees until it faces backwards.

3. Lay the display down onto the keyboard.

Switching ON and OFF a Computer

Computer is an electronic device. It is important to learn proper handling of computers. There are proper steps to switch on and switch off of a computer system.
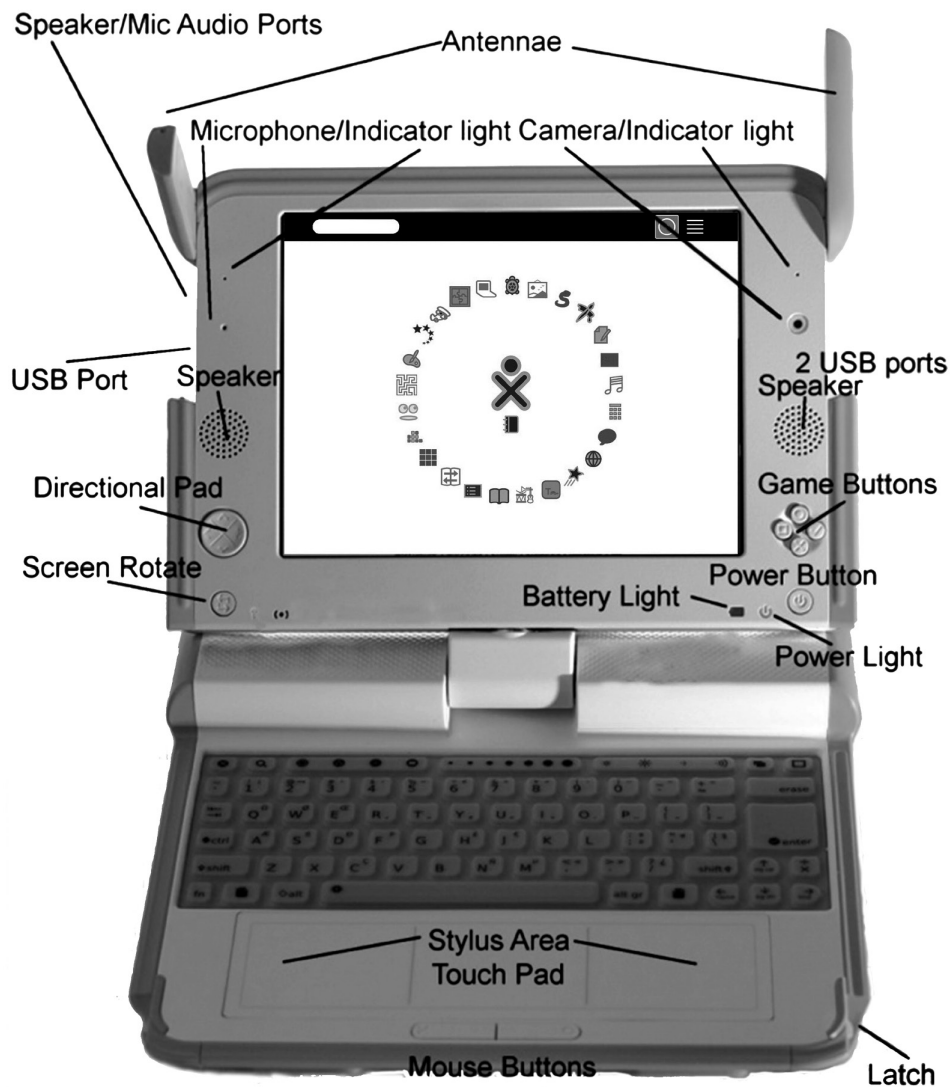
Components of an XO Laptop

To switch ON an XO Laptop, follow these steps:

- Press the power button. The XO starts up after about two minutes.
- It will ask your name first time.
- Next time it will remember your name and go directly to the Home screen.

1. Enter your name.

2. Once you enter your name, click **Done**.

3. Choose your colours by clicking repeatedly.

4. Once you have chosen your colours, click **Done**.
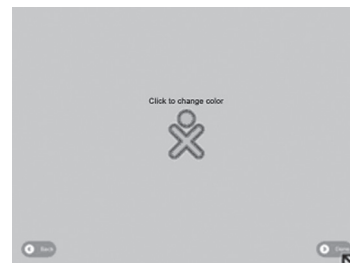
Your screen looks like this when the laptop is ready to begin.

To switch OFF an XO Laptop, follow these steps:

1. Go to the **Home view**.
2. Take the pointer over the middle XO icon until you see a menu.
3. The **Reboot** and **Shutdown** options will appear.
4. Choose **Shutdown** option to ensure your laptop shuts down properly.

Some Shortcut Keys in Sugar Interface

Shortcuts	Description
Ctrl+c	Copy to clipboard
Ctrl+v	Paste from clipboard
Ctrl+x	Cut (and copy to clipboard)
Ctrl+a	Select all (current input/dialog/text box)
Ctrl+q	Quit activity
Ctrl+Esc	Quit activity
Alt+Enter	Toggle full-screen mode
Alt+Space	Toggle tray visibility (works in Browse but not in Record)
Ctrl+u	View source in Browse (opens copy of source in Write)
Fn+Space	View source (system wide, although not enabled in all applications yet)
Alt+1	Screen capture; saved to Journal as a PNG file named "Screenshot of N" where N is the activity or window name
Alt+Shift+s	Say text

3.11 WEB LINKS FOR CONTENT ENRICHMENT

- http://ict-tutor.weebly.com/basic-terminology.html
- https://www.sugarlabs.org/
- www.wou.edu/~ulvelad/courses/.../Assets/UsesBenefitsJournal.pdf

3.12 SOLUTIONS TO UNIT REVIEW EXERCISES

I.   Fill in the blanks with the correct options:

1. (a)	**2.** (b)	**3.** (c)
4. (d)	**5.** (a)	

II. State whether the following statements are true or false:

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

III. Match the following:

1. (e)	**2.** (d)	**3.** (a)
4. (c)	**5.** (b)	

IV. Answer the following questions briefly:

1. There are various roles of computers in our daily life.

    (a) It can be used for personal computing.

    (b) It can be used for educational references.

    (c) It can be used in the field of health and medicine.

    (d) It can be used for scientific research.

    (e) It can be used for communication and entertainment.

2. *Data***:** Whatever you have typed from the keyboard is the **data**. It may be numbers, letters and symbols. Data is something on which operations are performed by a computer.

    Information: The processed data is called **information**. In a computer, we can get information through output devices, for example: monitor and printer.

3. The following are some features of a website:

    (a) It is a collection of web pages related to each other by certain topics.

    (b) A website is created by an organisation or an individual to give information about a topic or an organisation.

    (c) Each website has its own unique web address.

     (d)   It can be reached through an Internet connection by typing domain name in the address bar.

     (e)   The opening page of a website is called homepage.

4.   (a)   *Scroll bar*: Using the scroll bar, you can move through the list.

     (b)   *Gedit Text Editor*: Gedit Text Editor can read, create, or modify any kind of simple text without any formatting.

     (c)   *GNOME Interface*: Gnome is a graphical user interface. It has many applications designed to help you in your daily work.

     (d)   *System menu*: The system menu provides options for configuring the system and desktop environment. These may be such as desktop theme and screen resolution.

     (e)   *Workspaces*: The Gnome desktop allows multiple workspaces to be active at any one time with different applications and windows visible on each workspace.

5.   **To switch ON a Computer**

    (a)   *Desktop Computer*

       1.   Switch ON the main power supply.

       2.   Switch ON the uninterruptible power supply (UPS).

       3.   Switch ON the power button of the system unit.

       4.   Switch ON the monitor.

    (b)   *XO Laptop*

       1.   Push the Power button to turn on the laptop.

   To switch OFF a Computer

    (a)   *Desktop Computer*

       1.   Click on the Start ⊞ button. A menu appears on the screen.

       2.   In the right pane of the Start menu, click on the Shut down button.

       3.   Switch OFF the UPS.

       4.   Switch OFF the main power supply button.

       5.   Swit**ch OFF the monitor.**

    (b)   *XO Laptop*

       1.   Hover over the XO icon in the centre of the Home view.

       2.   A menu appears

       3.   Choose the Shutdown button.

6.   The Journal Activity is an automated diary of everything you do within Sugar. Sugar Activities use the Journal as a place to save your work.

V. Complete the following crossword puzzle using the clues below:

Across	Down
2. Interface	**1.** Technology
6. Information	**3.** Software
7. Internet	**4.** Data
	5. Computer

3.13 ASSESSMENT METHODS

Use observation technique, question answer technique, and demonstration technique to assess the learners' achievement of learning objectives.

3.14 ASSESSMENT

1. List at least two roles of a computer in our daily life.
2. The processed data is called information. (True/False)
3. What do you understand by communication?
4. .... is a large group of computers connected to each other. (Internet/Information)
5. It is a set of instructions for a computer to perform specific operations.
6. Using which key you can move through the list?
7. A window is a .... area of the screen. (rectangular/perpendicular)

Answers

1. (i) It can be used for personal computing.
   (ii) It can be used in the field of health and medicine.
2. True
3. Communication is the process of transferring or exchanging information.
4. Internet
5. Computer software
6. Scroll bar
7. rectangular

UNIT 4—WRITING SKILLS

4.1 LEARNING OBJECTIVES

At the end of this unit, the learners should be able to:

Knowledge and Understanding	Skills	Attitudes and Values
• Describe the different ways of formatting and editing a text. • Apply the keyboard special keys according to their roles. • Use the special keys to interact with the sugar interface. • Identify the special keys and use them accordingly.	• Write a text and apply formatting methods and techniques. • Construct or copy paragraphs and texts. • Perform writing text and paragraphs with more speed. • Use correctly the special keys and touchpad.	• Appreciate changing a text in different smarter ways. • Pay attention on typing errors. • Notice the use of the special keys. • Read voluntarily what they have written. • Care for the use of special keys.

4.2 CONTENTS

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                    ┌─────────────────┐
                    │  Writing Skills │
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  ┌────────────────┐ ┌────────────────┐ ┌──────────────────┐
  │ Text selection │ │ Text formatting│ │ The keyboard and │
  │                │ │                │ │  the touchpad    │
  └────────────────┘ └────────────────┘ └──────────────────┘
           │               │               │
           ▼               ▼               ▼
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Text selection	Text formatting	The keyboard and the touchpad
• Selecting – a character – a word – a paragraph – a whole document	• Bold, italics and underline • Font size and font style • Using colours • Capital and small letters • Save and open • Sharing and collaboration	• Frame key • Volume controls • Brightness control • Erase/delete etc.
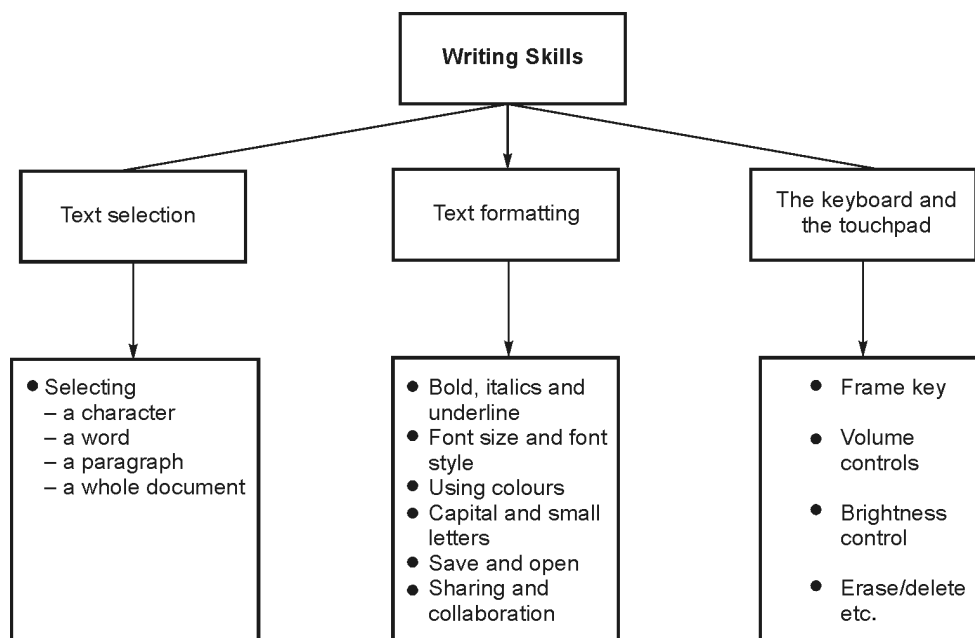
4.3 INTRODUCTION

This unit introduces the learners to:

- the selection of the text using keyboard and mouse.
- formatting of the text such as bold, italic, underline, changing font size, changing style, etc.
- the use of the keyboard and the touchpad.

4.4 TEACHING AIDS

- **Visual:** Presentation showing different ways of formatting.
- **Notes:** List of short-cut keys

    For example: Copy   →   Ctrl + C

                        Cut   →   Ctrl + X

                        Paste   →   Ctrl + V

                        Bold   →   Ctrl + B

                        Italics →   Ctrl + I

4.5 TEACHER'S TIP

You could start the unit by showing special keys on the keyboard to the learners. Explain the function of these keys. Show them how to use them to change a text in a smarter way.

You could take a paragraph and ask learners to type using keyboard. Make them aware of the general typing errors. Ask them to format the text. Check them individually and appreciate their creativity. Then mark their errors. Developing positivity in learners would aid them in learning more. Teach them how to use touchpad (mouse) and also the use of arrow keys. Introduce not only desktop but also keyboard to the learners.

4.6 TEACHING METHODS

- Demonstration, group discussion, role play and individual work.

4.7 TEACHING AND LEARNING MATERIALS

- XO laptop, books, notebook, pen, blackboard and chalk.

4.8 LESSON PARTITION

No.	Lesson Title	Contents	Learner's Activities	Number of Periods
1.	Text Selection	• Selection of text (a character, word, sentence, paragraph and a whole document) using keyboard • Selection of text (a character, word, sentence, paragraph and a whole document) using touchpad (mouse)	• Practising selection of text using keyboard and a touchpad (mouse).	2
2.	Formatting Text	• Description of different ways of formatting and editing a text o Bold, Italics and Underline o Font size and font style o Using colours o Capital and small letters o Save and open o Share and Collaboration	• Practising to change font type and to enlarge and reduce font size. • Practicing to change text colours, typing, moving and checking spelling in the text.	2

(*Contd...*)

3.	The Keyboard and Touchpad	• Identification of special keys and using them correctly.
		  o Frame key
		  o Volume controls
		  o Brightness control
		  o Erase/delete key
		  o Arrow keys, Alt key, Control key, Search keys, View keys, Enter key
			• Practising on using the left and right click on the touchpad (mouse).
			• Group work on searching/ connecting to friends in the neighbourhood view.
			• Practise using arrow keys to move the cursor downward, upward and in different ways.
			• Individually writing an autobiography.
				3

4.	Unit Revision	• Text selection • Text formatting • The keyboard and touchpad	• Answering unit review exercises.	1

4.9 TEACHING METHODOLOGY AND LEARNER'S ACTIVITIES

- The teacher should introduce the unit by writing some words on the chalkboard in different styles.
- He/She should call 2–3 learners to write their names on the chalkboard in different styles.
- He/She should explain the learners that the words can be written in a number of styles.
- Then he/she should explain that the same thing can be done in a computer too.
- The teacher can take the learners to a computer lab and show the different elements of an MS Word Window.

Lesson 1: Text Selection

- The teacher should help the learners understand the method of selecting text using a keyboard and a mouse.

Selecting Text Using Keyboard

Activity 1: Opening Microsoft Word, Writing and Selecting Text Using Keyboard

Step 1: The teacher should lead the learners to the computer lab.

Step 2: He/She should show the learners how to open the Microsoft Word.

Step 3: He/She should ask them to follow the steps given in the Pupil's book to carry out the activity.

Activity 2: Selecting Sentence, Paragraph and Document Using Keyboard

Step 1: The teacher should lead the learners to the computer lab.

Step 2: He/She should ask them to open new document.

Step 3: He/She should ask them to write a home life story.

Step 4: He/She should ask them to complete the activity by following the step-by-step procedure given in the Pupil's book.

Selecting Text with Mouse

- The teacher should discuss with the learners that we can use mouse to select characters, words, sentences, paragraphs or a whole document.

Activity 3: Selecting Word, Sentence, Paragraph and Document Using Mouse

- The teacher should guide the learners to carry out the activity themselves by following the steps given in the Pupil's book.

Lesson 2: Formatting Text

- The teacher will discuss the method of formatting text using MS Word.
- He/She should help the learners to carryout **Activity 4** given in the Pupil's book.

Activity 4: Formatting Text

Step 1: The teacher should arrange to take the learners into the computer lab.

Step 2: He/She should ask them to open the Microsoft Word.

Step 3: He/She should ask them to create a new document.

Step 4: He/She should let them type a document.

Step 5: He/She should show them the fonts menu.

Step 6: He/She should ask them to select the first two sentences and highlight in bold type by pressing the **Ctrl + B** keys.

Step 7: He/She should ask them to select the word "software", italicise and underline by clicking on I and U̲ or by pressing **Ctrl + I** for italic and **Ctrl + U** for underlining respectively.

Step 8: He/She should ask them to change the size of the whole text from 11 to 16, change the style from **Arial** to **Times New Roman** and put the first sentence in red colour.

- The teacher should discuss with the learners how to rectify the errors in the text through the option of spellcheck.

Changing the Character Case of the Text

Step 1: The teacher should discuss with the learners that character case indicates the case of the text and it is used to change the text from lower case to upper case or vice-versa.

Step 2: Ask the learners to change the character case of the text as given in the Pupil's book.

Spelling and Grammar Checking

Activity 5: Checking Spelling and Grammar

Step 1: The teacher should arrange to take the learners into the computer lab.

Step 2: He/She should ask them to open the Microsoft Word.

Step 3: He/She should ask them to create a new document.

Step 4: He/She should ask the learners to type the following text as it is:

On frrday, I went to the shoip to buyi tomatoies.

Step 5: Using the right button of mouse, let them click on the first word that has the red wavy line under it. Several choices will appear. Ask them to click on the correct one, that is, **Friday**.

Step 6: He/She should now ask the learners to click on the second word having the red wavy line under it, that is, **shoip**, using the right of the mouse. Several choices will appear. Ask them to click on the correct word, that is, **shop**.

Step 7: He/She should similarly, ask the learners to repeat the above process with the words **buyi tomatoies**.

Step 8: He/She should finally, explain the learners that spelling errors are displayed with a red wavy line under the text. A red wavy line means that the word is misspelt or is not an English word.

Saving and Opening a Word Document

- The teacher should guide the learners to save and open a word document as per the procedure given in the Pupil's book.

Sharing and Collaboration

- The teacher should guide the learners on the use of sharing and collaboration in Sugar Interface as given in the Pupil's book.

Activity 6: Sharing a Document

- The teacher should ask the learners to carry out **Activity 6** following the procedure given in the Pupil's book.

Group Work

- The teacher should ask the learners to go to their computer lab and search or connect to friends in the Neighbourhood View as given in the Pupil's book.

Activity 7: Identifying Different Formatting Buttons

Step 1: Before the activity starts the teacher should ask the learners to tell the names of the various buttons.

Step 2: He/She should then ask the learners to write the names of the given buttons in their notebooks.

Step 3: After half an hour, he/she should ask the learners one by one to read their answers aloud.

Step 4: He/She should then rectify the answers which are wrong.

Activity 8: Typing and Formatting a Document

Step 1: The teacher should arrange to take the learners into the computer lab.

Step 2: He/She should ask them to open the Microsoft Word.

Step 3: He/She should then ask them to create a new document.

Step 4: He/She should ask them to type the following document.

> ### Information and Communication Technology (ICT)
>
> ICT stands for Information and Communication Technology. Computer is the basic need in every field. Life becomes easier with the introduction of different ICT tools.
>
> Computers, mobile phones, calculators, radios, scanner and fax machines are the common ICT tools. These tools help us use information and share it digitally.

Step 5: He/She should ask them to select the heading "Information and Communication Technology (ICT)".

Step 6: He/She should ask them to make it bold.

Step 7: He/She should ask them to change its colour into red.

Step 8: He/She should ask them to underline it.

Step 9: He/She should ask them to change its style into Arial.

Step 10: He/She should ask them to select the first paragraph and change its case to uppercase.

Step 11: He/She should ask them to select the second paragraph and make it italic.

Step 12: Finally, he/she should ask them to save this document with the name 'ICT'.

Lesson 3: The Keyboard and Touchpad

- The teacher should discuss with the learners the role of keyboard and touchpad.

- He/She should guide the learners about the frame keys, volume control keys and brightness control keys available on the multimedia keyboard.

- He/She should further guide the learners about the special keys on the keyboard and the special functions they perform.

- He/She should discuss the applications of the special keys in MS Word document as given in the Pupil's book.

Lesson 4: Unit Revision

- The teacher should ask questions from the unit review exercises covering all lessons to assess the competences achieved by the learners.

4.10 ADDITIONAL CONTENT FOR THE TEACHER

Special Keys of Keyboard and Touchpad
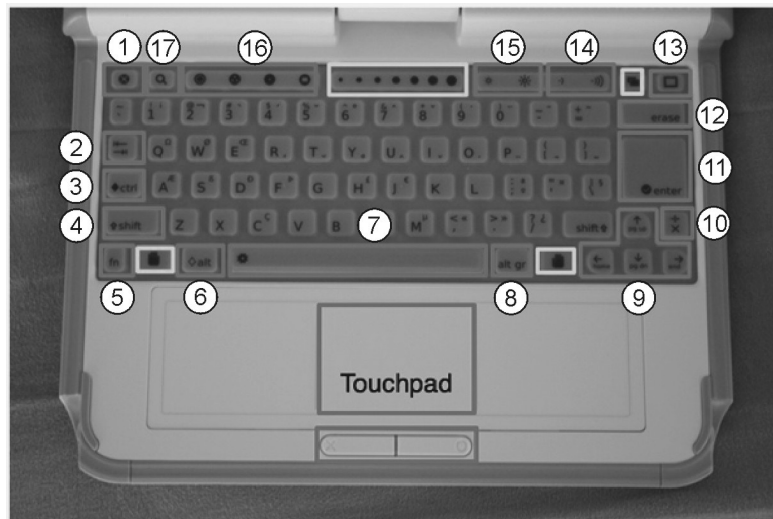
The keyboard and the touchpad have some special keys. These are:

1. **Escape key:** It is labelled with an × symbol on a black circle. It is commonly used in combination with the control key to quit activities **(Ctrl + Esc)**.

2. **Tab key:** It is labelled with arrows pointing right and left. The tab key is used in combination with the control, shift and alt keys to cycle through open Activities. For example, **Alt + Tab** cycles forward through running Activities.

3. **Control key:** It is used in combination with other keys to issue commands. For example, **Ctrl + C** is used to copy to the clipboard; **Ctrl + V** is used to paste from the clipboard.

4. **Shift key:** It is used in combination with other keys as a modifier, most commonly to shift between lowercase and uppercase in Latin-based alphabets.

5. **Fn key:** The function key is used in combination with other keys as a modifier. For example, **Fn + Erase** is delete; **Fn + Up arrow** is page up.

6. **Alt key:** It is used in combination with other keys to issue commands. For example, **Alt + Enter** toggles full-screen mode; **Alt + Space bar** toggles the tray visibility. This example works in the Browse Activity but not in the Record Activity.

7. **Space bar:** The space bar key types a space. In the future, when used in conjunction with the function key (**Fn**), it will eventually view the source code for the currently running Activity.

8. **Alt Gr key:** The alt graphics key is used in combination with other keys as a modifier, most commonly to select an alternative letter or generate an accented character. The details of this functionality vary from keyboard layout to keyboard layout: for example, on the US keyboard, **Alt gr + J** generates a € (euro sign); typing the character "a" followed by **Alt gr + 4** generating á.

9. **Arrow keys:** The arrow keys are used for navigation. Combined with the function key (**Fn**), they are used for page up, page down, home, and end.

10. **Language key:** The language key is found on keyboard layouts that combine Latin and non-Latin scripts. It toggles between scripts, so, for example, one can switch between typing in English and Kinyarwanda with a single keystroke. (On Latin-only keyboards, the language key has been replaced by a × and ÷ key.)

11. **Enter key:** The enter key—in addition to its standard use—is used in combination with modifier keys. For example, **Alt + Enter** toggles full-screen mode.

12. **Erase key:** The erase key deletes the character behind the cursor (backspace). **Fn + Erase** deletes the key in front of (or on) the cursor.

13. **Frame key:** The Frame key toggles the presence of the Frame on the screen. The Frame is the black border around the screen that holds the Activity taskbar, clipboard, wireless connections, battery level, and so on.

14. **Volume controls:** The volume keys lower and raise the audio level.

15. **Brightness controls:** The brightness keys lower and raise the brightness of the screen backlight. It may take 7–8 button presses to turn the backlight off completely.

16. **View keys:** The four view keys, from left to right, take you to the Neighbourhood view, the Group view, the Home view, and the Activity view.

17. **Search key:** The search key takes you directly to the Journal and places the text cursor in the search box.

4.11 WEB LINKS FOR CONTENT ENRICHMENT

- http://www.gcflearnfree.org/word2013/8
- http://jedit.org/users-guide/selection.html
- https://www.cs.swarthmore.edu/help/vim/selection.html

4.12 ANSWERS TO ACTIVITY

Activity 7

(i) Bold	(ii) Italic	(iii) Underlined
(iv) Font size	(v) Font list box	(vi) Colour box
(vii) Change case box	(viii) Save as	(ix) Open document

4.13 SOLUTIONS TO UNIT REVIEW EXERCISES

I. **Fill in the blanks with the correct options:**

1. (a)	**2.** (b)	**3.** (b)
4. (a)	**5.** (d)	

II. **State whether the following statements are true or false:**

1. True	**2.** True	**3.** False
4. False	**5.** True	
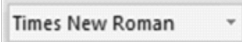
III. **Match the following shortcut keys with their functions:**

1. (e)	**2.** (c)	**3.** (a)
4. (b)	**5.** (d)	

IV. Answer the following questions briefly:

1. Formatting the text means changing the style, colour, and size of the desired text. There are many tools in MS Word to do these.

2. To select a paragraph with mouse, triple click anywhere on the paragraph.

3. To select a whole document:

   (a) Place the cursor anywhere on the document.

   (b) Press **CTRL + A**.

4. A keyboard is an input device of a computer system. Data are entered into the computer with the help of the keyboard. It plays a very crucial role while working on a computer.

   A touchpad is a pointing device on laptops and some keyboards. It is operated by using fingers. It allows the user to touch an area on the screen in order to enter data. Like a computer mouse, it also has two buttons. These two buttons allow the user to left-click or right-click.

5. (a) It starts a new paragraph in a document.

   (b) It cancels any command or exits the program.

   (c) It moves the cursor to the end of the line.

   (d) It moves the cursor to the beginning of the line.

   (e) It erases the characters from right side of the cursor.

6. (a) To change the font colour of the text:

   1. Select the text whose font colour is to be changed using the keyboard or the mouse.

   2. Click on font colour box on the Home tab of the Ribbon. It shows the colour of the text at present.

   3. Select your desired font colour from the drop down list.

   (b) To change the font style of the text:

   1. Select the text whose font style is to be changed using the keyboard or the mouse.

   2. Press Ctrl + Shift + F or click on font list box on the Home tab of the Ribbon. The font size box shows the current font style.

   3. Select the required font style from the drop down list. Let us select font style. The selected text changes to the style of your selection.

(c)   To save a word document:

1.   Press Ctrl + S or click on the ⊞ button on the Home tab of the Ribbon. The Save As window will appear.

2.   Select the location in the computer where you wish to save the document.

3.   Write a file name in the **File name** box.

4.   Click on the **Save** button.

V. Complete the crossword puzzle using the clues below:

Across	Down
3. Collaboration	**1.** Frame keys
4. SkyDrive	**2.** Touchpad
5. Keyboard	

4.14 ASSESSMENT METHODS

Use observation technique, question answer technique, and demonstration technique to assess the learners' achievement of learning objectives.

4.15 ASSESSMENT

1. Name two input devices that are used in computer.
2. Write one use of mouse.
3. What do you understand by 'formatting a text'?
4. Which keys are used to save a document?
5. What does ICT stand for?
6. Touchpad is operated by using ………............ (fingers/mouse)

Answers

1. Keyboard and mouse.
2. We can use mouse to select characters and words.
3. Formatting a text means changing the style, colour and size of the desired text.
4. CTRL + S
5. ICT stands for Information and Communication Technology.
6. fingers

UNIT 5—GRAPHICS AND MULTIMEDIA

5.1 LEARNING OBJECTIVES

At the end of this unit, the learners should be able to:

Knowledge and Understanding	Skills	Attitudes and Values
• Draw by free hand class and home objects. • Apply different colours to improve drawn objects. • Insert a comment on an image to make it more meaningful. • Resize and locate the image in the paint window.	• Control the movement of the touchpad (mouse). • Draw and produce images for different objects. • Master drawing geometric shape seen in the class. • Copy the images drawn by others. • Improve the presentation of the image.	• Paying attention to typing errors. • Notice the use of special keys. • Read the comments attached to images. • Care for the use of special keys.

5.2 CONTENTS

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                    ┌─────────────────┐
                    │  Graphics and   │
                    │   Multimedia    │
                    └─────────────────┘
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┌─────────────────┐ ┌─────────────────┐ ┌─────────────────┐
│  Paint window   │ │ Drawing using   │ │ Comments on a   │
│                 │ │  free hands     │ │    picture      │
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         │                  │                  │
┌─────────────────┐ ┌─────────────────┐ ┌─────────────────┐
│• Primary toolbar│ │• Drawing tools  │ │• Comments       │
│• Secondary      │ │  (pencil, eraser│ │  on a picture   │
│  toolbar        │ │  and bucket)    │ │• Save, close,   │
│• Tool brush     │ │• Drawing using  │ │  open           │
│  properties     │ │  shapes         │ │                 │
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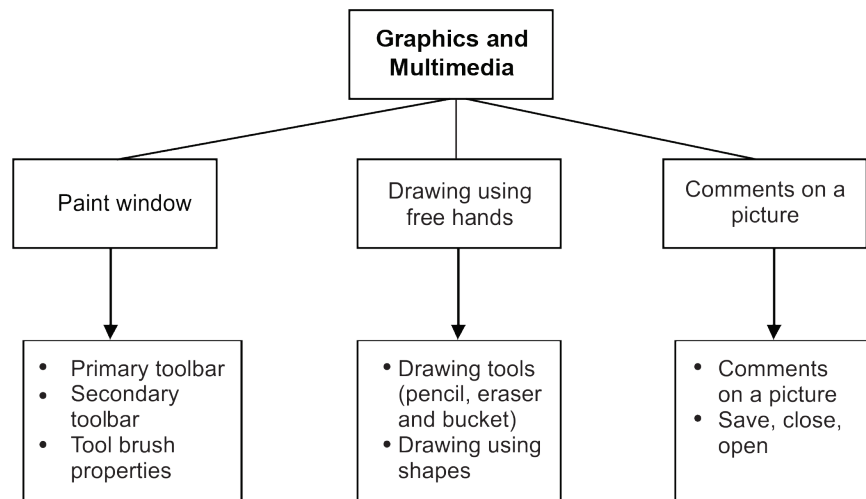
5.3 INTRODUCTION

This unit introduces learners to:

- the definition and role of Microsoft Paint application, how to start paint program in a computer, different tool bars of a paint program.
- basics of paint window such as primary tool bar, secondary tool bar, tool brushes, etc.
- drawing tools such as pencil, eraser and bucket.

5.4 TEACHING AIDS

- **Visuals:** Images of different objects
- **Vocabulary:** Name of Geometrical Shapes

5.5 TEACHER'S TIP

You could start the unit by defining Multimedia. It is the use of computers to present text, graphics, video, animation and sound in an integrated way. This requires the use of Paint application. Make the learners aware of the usage of Paint application. Tell them about the use of keys to draw, colour and design different shapes. Assign them to draw a plan of the classroom. Ask them to use special keys and fill it with colour. Motivate them by viewing the plan and tell them about the common errors. Also explain how they may use the knowledge to improve their projects correctly.

5.6 TEACHING METHODS

- Practical work, individual exercise

5.7 TEACHING AND LEARNING MATERIALS

- XO laptop

5.8 LESSON PARTITION

No.	Lesson Title	Contents	Learner's Activities	Number of Periods
1.	Paint Application	• Definition and role of paint activity • Starting the paint activity	• Visiting computer lab to practise starting paint activity in Sugar interface and observing Paint window.	1
2.	Toolbar	• Location of primary and secondary toolbar • Use of tools of primary toolbar • Use of tools of secondary toolbar– Edit tool, Brush tool, Shapes tool, and Image Editing tool	• Practising editing and cropping images made by other activities. • Practising to manage colours to produce a smart image or photos.	1
3 4	Drawing with Free Hands Drawing Using Shapes	• Drawing using drawing tools (pencil, eraser and bucket) • Drawing using geometric shapes	• Practising drawing lines, square, rectangle and circle using shapes or free hands. • Practising drawing a cartoon using shape tool.	1
5.	Comments on a Picture and Save, Close and Open an Activity	• Texts • Colours • Saving and closing an activity • Opening an activity	• Drawing and colouring an image of a hut in a forest and writing a meaningful comment on it.	1
6.	Unit Revision	• Paint Application • Toolbar • Drawing with free hands • Comments on a picture • Save, close and open an activity	• Answering unit review exercises.	1

5.9 TEACHING METHODOLOGY AND LEARNER'S ACTIVITIES

Lesson 1: Paint Application

Definition and Role

- The teacher should begin the lesson by discussing the definition and the role of paint application.
- He/She should tell the learners that Paint is an activity in Sugar Interface.
- Thereafter, he/she should ask the learners to carry out **Activity 1** given in the Pupil's book.

Activity 1: Starting the Paint Activity

- The teacher should ask the learners to carry out the activity by following the procedure given in the Pupil's book.

Lesson 2: Toolbar

- The teacher should start this lesson by showing Primary and Secondary Toolbars on the screen to the learners.

Primary Toolbar

- The teacher should discuss the functions of the tools such as brush tool, shape tool, etc., available on the primary toolbar as given in the Pupil's book.
- He/She should ask the learners to do **Activity 2** given in the Pupil's book.

Activity 2: Practising Editing and Cropping an Image

Step 1: The teacher should ask the learners to take an image of market place from the Internet.

Step 2: He/She should ask the learners to reduce its size with the help of crop tool, delete some of unwanted parts from it and change the colour of image.

Secondary Toolbar

- The teacher should discuss the functions of the tools such as Edit tools, Brush tools, shapes, text tool, image editing etc., available on the secondary toolbar as given in the Pupil's book.

Lesson 3: Drawing with Free Hands

- The teacher should ask the learners to draw pictures with free hands using drawing tools (pencil, eraser and bucket).
- He/She should ask them to carry out **Activity 3** given in the Pupil's book.

Activity 3: Drawing a House with Free Hands

The teacher should ask the learners to draw picture of a house using drawing tools such as pencil, eraser and bucket by following the step-by-step procedure given in the Pupil's book.

Lesson 4: Drawing Using Shapes

- The teacher should guide the learners to open Paint and select different shapes of tool and fill with colour.
- He/She should guide the learners to carry out **Activities 4** and **5** given in the Pupil's book.

Activity 4: Drawing a Cartoon Using Shapes Tool

- The teacher should ask the learners to draw a cartoon using shapes tool by following the step-by-step procedure given in the Pupil's book.

Activity 5: Drawing Images Using Geometric Shapes

Step 1: The teacher should ask the learners to draw an image of a school bus with the help of geometric shapes only.

Step 2: Ask them to fill colour in it with the bucket tool.

Lesson 5: Comments on a Picture and Save, Close and Open an Activity

- The teacher should start the lesson by asking the learners to add comments on a picture.
- He/She should ask the learners to carry out **Activities 6, 7, 8** and **9** given in the Pupil's book.

Comments on a Picture

Activity 6: Commenting on a Picture

Step 1: The teacher should ask the learners to go to home view and press F5.

Step 2: He/She should ask them to select the Activity on which they want to comment.

Step 3: Ask them to type their comment about their activity. It will be automatically saved.

Activity 7: Commenting on Images

Step 1: The teacher should ask the learners to draw an image of hut in the forest with the help of geometric tools and free hand.

Step 2: He/She should ask them to fill suitable colour in the image.

Step 3: Finally, he/she should ask them to write meaningful comment for the image.

Saving and Closing an Activity

Activity 8: Saving and Closing an Activity

- The teacher should ask the learners to save and close an activity by following the procedure given in the Pupil's book.

Opening a Saved Activity

Activity 9: Opening a Saved Activity

- The teacher should guide the learners to carry out the activity by following the procedure given in the Pupil's book.

Lesson 6: Unit Revision

- The teacher should ask questions from the unit review exercises covering all lessons to assess the competences achieved by the learners.

5.10 ADDITIONAL CONTENT FOR THE TEACHER

Paint Activity allows the users to create paintings or drawings. It is a versatile Activity with many uses such as:

- Creating drawings or paintings,
- Creating images for inserting into Write documents,
- Creating slides for a Portfolio Activity slide show,
- Creating images for using in other Activities including Turtle Blocks and many more,
- Editing and cropping images made by other Activities including Turtle Blocks and many more,
- Editing and cropping screenshots (take screenshots with Alt+1),
- Editing and cropping photos taken with the Record Activity.

Note: Paint does not support sharing. You can use Turtle Blocks for collaborative drawing.

5.11 WEB LINKS FOR CONTENT ENRICHMENT

- http://en.flossmanuals.net/sugar/ch034_troubleshooting-guide/
- https://wiki.sugarlabs.org/go/Activities/Paint
- http://wiki.laptop.org/go/Paint_act

5.12 SOLUTIONS TO UNIT REVIEW EXERCISES

I. Fill in the blanks with the correct options:

    1. (b)   **2.** (a)   **3.** (a)   **4.** (b)

II. State whether the following statements are true or false:

    1. True   **2.** True   **3.** True   **4.** False

    5. True

III. Match the following:

    1. (e)   **2.** (d)   **3.** (b)   **4.** (a)

    5. (c)

IV. Answer the following questions briefly:

    1. The Paint Activity is used to draw, colour and edit pictures.

    2. The Primary toolbar is located at the top of the screen.

        Each toolbar contains a logically grouped set of buttons and controls, as the name on its corresponding tab suggests. Each of these sets represents a distinct editing or control context, called Secondary Toolbar.

    3. (a) **Brush tool:** Brush tool is used for painting and editing image colour. The Brush tool works like traditional drawing tools for applying colour.

        (b) **Eraser:** This tool is used to erase areas of your picture or clipart.

        (c) **Bucket:** This tool is used to fill the entire picture or an enclosed shape with colour.

        (d) **Picker:** This tool is used to pick colour from other objects.

    4. (a) Undo: Ctrl + Z   (b) Redo: Ctrl + Y

        (c) To go for the Home view: F5   (d) To close a Paint Activity: Ctrl + Q

5.13 ASSESSMENT METHODS

- The teacher should use observation technique, question answer technique, and demonstration technique to assess the learners' achievement of learning objectives.

5.14 ASSESSMENT

1. ……………. is an activity in Sugar Interface. (Paint/DOS)
2. Which tool is used to type text in your activity and change the format of text?
3. Copy command creates a duplicate of selected clip. (True/False)
4. How does brush tool work?
5. Which tool is used to pick colour from other objects?

Answers

1. Paint
2. Text tool
3. True
4. The Brush tool works like traditional drawing tools for applying colour.
5. Colour picker

UNIT 6—PROGRAMMING FOR CHILDREN

6.1 LEARNING OBJECTIVES

At the end of this unit, the learners should be able to:

Knowledge and Understanding	Skills	Attitudes and Values
• Identify different tools in the Turtle Art Window. • Describe different components of Scratch Window. • Associate different commands to develop animations. • Outline the steps of saving and opening a project. • Explain how to save and open a file.	• Construct and produce different geometric shapes using turtle art instructions. • Observe practice and organize the turtle art instructions correctly. • Practise and correctly manage the components of scratch window. • Create and animate objects by arranging the instructions required in the proper sequence.	• Conceptualise the ICT contribution in the real life. • Express the desire to draw more colourful drawings using turtle art commands. • Appreciate an animated object. • Pay attention on how to use command and make animations. • Appreciate how to arrange commands and produce animations.

6.2 CONTENTS

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                        │   for Children   │
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Elements of turtle art window	Use turtle art instructions	Drawing	Save a document, close and open Turtle Art activity	Identification of the components of scratch window	Object animations (Animate an object)
• Main toolbar (drag and drop the blocks) • Palettes tool bar	• Forward, Back, Left, Right, Arc, Clean	• Lines: vertical, horizontal and oblique • Square, Rectangle Circle	• Save • Close • Open	• Command palette • Script pane • Stage Pane • Thumbnails pane	• Add blocks to scripts (drag and drop commands) • Play/Execute scripts • Save and open a project • Close and open Scratch activity

6.3 INTRODUCTION

- This unit introduces the learners to the basic concepts of Turtle Art Window such as main toolbar (drag and drop the blocks), Palettes toolbar and use of Turtle Art instructions.

- This unit also introduces the learners with how to save, close and open a document in Turtle Art activity and object animation such as choose new Sprite from file, change background, add blocks to scripts, etc.

6.4 TEACHING AIDS

- **Audio-video Clips:** Video showing how to drag and drop the blocks from the Turtle Palette to the main area.

- **Visuals:** Animations

- **Powerpoint Presentation:** Presentation showing how to arrange commands and produce animations.

6.5 TEACHER'S TIP

You could introduce Turtle Art to the learners and start the unit. Turtle Art is a example of a programming language. It allows the learners to draw pictures and designs. Ask the learners to draw more colourful drawings using Turtle Art commands. Sit and teach the commands. It provides an easy entry point for the beginners. Create animations using Scratch Activity. Ask the learners to explore the commands. This will challenge more adventurous learners. Its features such as graphics, mathematics and computer science will add knowledge to learners.

6.6 TEACHING METHODS

- Practical work, individual work, group work and group discussion

6.7 TEACHING AND LEARNING MATERIALS

- XO laptop, blackboard and chalk

6.8 LESSON PARTITION

No.	Lesson Title	Contents	Learner's Activities	Number of Periods
1.	Turtle Art	• Introduction to Turtle art	• Practising how to start up Turtle Art	1
2.	Elements of Turtle Art Window	• Identification of elements of Turtle art window. • Use of Main toolbar (drag and drop the blocks) • Use of Palettes Tool bar	• Practising how to drag and drop the blocks from the Turtle Palette to the main area • Practising how to delete a block by dragging it back onto the palette	1
3.	Using Turtle Art Instructions/ Commands	• Use of Turtle art instructions to construct and produce different geometric shapes	• Practising to use Turtle Art instructions.	3
4.	Drawing	• Drawing vertical, horizontal and oblique lines using multiple blocks from Turtle Palette. • Drawing geometrical shapes such as a Square, a Rectangle and a Circle using Turtle Art.	• In Pairs work exercises on correctly arranging the blocks in order to draw different lines. • Practising drawing a square, rectangle and a circle by arranging the blocks in the correct sequence.	2

(*Contd...*)

5.	Saving a Document, Closing and Opening Turtle Art Activity	• Saving a document • Closing Turtle Art activity • Opening Turtle Art activity	• Practising saving, closing and opening a document.	2

6.	Scratch Window	• Identification of the components of scratch window
		  o Command palette
		  o Script pane
		  o Stage pane
		  o Thumbnails pane
		• Description of different components of scratch window.
			• Practising and learning Scratch programming environment	5

7.	Object Animations (Animate an Object)	• Choose new sprite from file • Change background • Add blocks to scripts (drag and drop commands) • Play/Execute scripts • Save and open a project • Close and open Scratch activity	• Practising and learning on choosing sprite, changing costumes and backgrounds • Practising creating animations, using the steps of saving and opening a project in Scratch	5
8.	Unit Revision	• Elements of Turtle Art • Using Turtle Art instructions/commands • Drawing • Saving a document • Identification of components of Scratch window • Object animations (animate an object)	• Answering unit review exercises	1

6.9 TEACHING METHODOLOGY AND LEARNER'S ACTIVITIES

- The teacher should begin the unit by asking the learners to name few popular programming languages.
- He/She should let them answer these questions independently.
- After listening to their answers, he/she should tell the learners that Turtle Art and Scratch are two popular programming languages for kids.

Lesson 1: Turtle Art

- The teacher should discuss with the learners that Turtle Art program allows children to draw colourful and complex images.
- He/She should ask the learners to carry out **Activity 1** given in the Pupil's book.

Activity 1: Starting up Turtle Art
The teacher should ask the learners to click on the Turtle icon in the Home View.

Lesson 2: Elements of Turtle Art Window

- The teacher should discuss with the learners, the elements of the Turtle Art window, i.e., the Main toolbar and the Palettes toolbar.
- He/She should ask the learners to read and discuss the tools of Main toolbar and Palettes of Palettes toolbar.

Activity 2: Adding and Deleting Blocks
Step 1: The teacher should ask the learners to practise the method of adding a block by dragging it from the palette to the main area.
Step 2: He/She should ask them to practise the method of deleting a block by dragging it back onto the palette.

Lesson 3: Using Turtle Art Instructions/Commands

The teacher should discuss with the learners the instructions they can use in Turtle Art as given in the Pupil's book.

Lesson 4: Drawing

The teacher should discuss with the learners how to use multiple blocks from the Turtle Palette, to draw lines (horizontal and vertical), square, rectangle and circle as given in the Pupil's book.

Activity 3: Drawing Geometrical Shapes Using Turtle Art

The teacher should guide the learners to draw a vertical line, horizontal line, oblique line, a square, a rectangle and a circle using Turtle Art as per the procedure given in the Pupil's book.

Lesson 5: Saving a Document, Closing and Opening Turtle Art Activity

The teacher should ask the learners to save a document, close and open the Turtle Art Activity following the step-by-step procedure given in the Pupil's book.

Lesson 6: Scratch Window

- The teacher should discuss with the learners that Scratch is a fun programming language. It allows us to create games, stories and animation.
- He/She should ask the learners to carry out **Activity 3** following the procedures given in the Pupil's book.

Activity 4: Getting Started Scratch Window
- The teacher should ask the learners to go to the folder where they copied the Scratch.
- He/She should ask them to double click the Scratch icon to get the Scratch Window.
- He/She should ask the learners to read the text given in the Pupil's book and then discuss the components of Scratch Window such as Command Palette, Toolbar, Script Pane, Stage Pane and Thumbnails Pane.

Lesson 7: Object Animations (Animate an Object)

- The teacher should guide the learners to animate an object themselves by following the steps given in the Pupil's book.
- He/She should ask the learners to practise creating animations, using the steps of saving and opening a project in Scratch.
- He/She should ask the learners to practise choosing new sprite from file, changing the background, adding blocks to scripts, playing/executing scripts, saving a project, closing Scratch Activity and opening a project.

(a) **Choosing New Sprite from File**

- The teacher should ask the learners to follow the steps given in the Pupil's book to choose New Sprite from file.

(b) **Changing the Background**

- The teacher should ask the learners to change the background of an object by following the step-by-step procedure given in the Pupil's book.

(c) **Adding Blocks to Scripts**

Activity 5: Creating a Project by Adding Blocks to the Script

- The teacher should ask the learners to carry out the activity by following the procedure given in the Pupil's book.

(d) **Playing/Executing Scripts**

- The teacher should ask the learners to play/execute Scripts as given in the Pupil's book.

(e) **Project**

- The teacher should guide the learners to save a project as per the steps given in the Pupil's book.

Closing Scratch Activity and Opening a Project

- The teacher should ask the learners to close Scratch Activity and open a project as per the procedure given in the Pupil's book.

Activity 6: Creating and Animating a Sprite

Step 1: The teacher should ask the learners to create a sprite in the Scratch Window.

Step 2: He/She should ask them to animate it by arranging the instructions required.

Lesson 8: Unit Revision

- The teacher should ask questions from unit review exercises covering all lessons to assess the competency achieved by the learners.

6.10 ADDITIONAL CONTENT FOR THE TEACHER

Some Popular Fun Programming Languages

There are five popular fun programming languages. These are:

Scratch

It is developed by the MIT Media Lab. It is a visual programming language for children age 6 and above. Scratch is available free of charge and runs on Mac, Windows, and Linux Operating System.
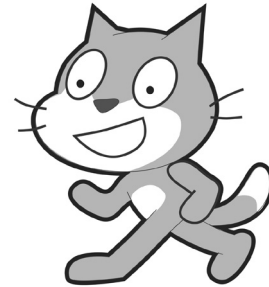
Alice

Alice is a free and open source 3D programming environment. With Alice, the learners drag and drop graphic tiles in order to animate an object and create a program. A variant of Alice, Storytelling Alice was developed by Caitlin Kelleher as a part of her doctoral work in Computer Science at Carnegie Mellon University.

Hackety Hack

Hackety Hack is an open source application that teaches the basics of programming in the popular Ruby language. Hackety Hack offers an interactive tutorial that runs on Windows, Mac, and Linux operating systems.

Arduino

Arduino is an open-source electronics prototyping platform with both hardware and software components. Projects that use Arduino to introduce children to programming include a modification of Scratch to support simple programming on the Arduino hardware.

Lego Mindstorms

One of the most popular toys in history, Lego may be best known for its brick-building. But Lego Mindstorms also enables robotics-building. Like several of the tools on this list, Lego Mindstorms has its roots at the MIT Media Lab.

6.11 WEB LINKS FOR CONTENT ENRICHMENT
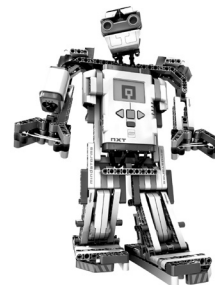
- http://holowczak.com/programming-concepts-tutorial-programmers/
- http://laptop.org/8.2.0/manual/Sugar_Interface.html

6.12 SOLUTIONS TO UNIT REVIEW EXERCISES

I. Fill in the blanks with the correct options:

1. (a)   **2.** (b)   **3.** (a)   **4.** (d)

5. (b)

II. State whether the following statements are true or false:

1. True   **2.** True   **3.** True   **4.** False

5. False

III. Match the following:

1. (e)   **2.** (d)   **3.** (a)   **4.** (b)

5. (c)

IV. Answer the following questions briefly:

1. Scratch and Turtle Art are two popular programming languages for the kids.

2. Using Arc Command you can draw a part of the circle. The angle is the part of the circle the turtle draws.

3. Categories of Command Palette Motion, Looks, Sound, Pen, Control, Sensing Operators and Variables.

4. (a) Using **Forward** command, you can move the turtle forward with the number of pixels entered.

     (b) Using **Back** command, you can move the turtle backward with the number of pixels entered.

     (c) Using **Left** command, you can change the turtle's direction to the left by a specified angle.

     (d) Using **Right** command, you can change the turtle's direction to the right by a specified angle.

5. (a) To draw a horizontal line:

- Turn the turtle right 90 degrees.
- Then move the turtle forward 100 spaces.

(b) To draw a rectangle:

- Move the turtle forward 250 spaces.
- Then turn the turtle right 90 degrees.
- Move the turtle forward 500 spaces.
- Then turn the turtle right 90 degrees.
- Move the turtle forward 250 spaces.
- Then turn the turtle right 90 degrees.
- Move the turtle forward 500 spaces.
- Now the turtle comes to its original position and forms a rectangle.

6. To open a Scratch Activity:

- Go to the folder where you copied the Scratch.
- Double click the Scratch icon. You will see the Scratch Window.

V. **Complete the following crossword puzzle using the clues below:**

Across	Down
3. Turtle art	**1.** Scratch
4. Clean	**2.** Program

6.13 ASSESSMENT METHODS

The teacher should use observation technique, question answer technique and demonstration technique to assess the learners' achievement of learning objectives.

6.14 ASSESSMENT

1. Using …………… command, you can clean or clear the screen of all drawings. (clean/arc)
2. Scratch is a fun programming language. (True/False)
3. …………… moves sprites and changes angles. (Motion/Clock)
4. The…………. pane of scratch is called the Scripting Pane. (end/middle)
5. …………. is a part of Programmig language. (Turtle Art/Scratch)

Answers

1. clean	2. True
3. Motion	4. middle
5. Turtle Art	

UNIT 7—AIR, WIND AND SOUND

7.1 LEARNING OBJECTIVES

At the end of this unit, the learners should be able to:

Knowledge and Understanding	Skills	Attitudes and Values
• Identify properties of air. • Explain the composition of air. • Explain the utility of air components in daily life. • Explain the dangers of components of air and how to prevent them. • Identify the types of wind. • Explain the importance of air and wind in the environment. • Explain the dangers of wind and how to prevent them. • Explain the nature of sound. • Explain the sound propagation. • Distinguish sound from noise. • Identify the damaging effects of noise on hearing system. • Explain how to protect ears from noise.	• Design devises to get enough air in homes/ classrooms. • Compare the various components of air based on their utility. • Design an experiment to identify the side effects of Carbon monoxide. • Compare the types of winds. • Apply techniques of prevention of our environment from strong wind. • Design and use a devise showing that the sound travels through a medium. • Design and use devises to protect one's ears from noise.	• Appreciate the importance of air and wind in our environment. • Show concern for dangers brought by strong wind and how to overcome them. • Develop positive attitude towards the utility of Oxygen. • Show concern on the utility and dangers of Carbon dioxide. • Be aware of the dangers of Carbon monoxide. • Show concern about air pollution issues. • Show awareness of the effects of sound on human hearing. • Be careful and avoid long exposure to harmful noise.

7.2 CONTENTS

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        │   Air    │      │   Wind   │      │  Sound   │
        └──────────┘      └──────────┘      └──────────┘
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Air	Wind	Sound

• Main properties of air
• Uses of air composition
  – Uses of oxygen
  – Uses of carbon dioxide
• Dangers of components of air
  – Carbon dioxide
  – Water vapour
	• Types of wind
	• Uses of air and wind
	• Dangers of wind
	• Prevention of dangers of wind
		• Nature of sound
		• Sound production
		• Sound propagation and transmission
		• Sound and noise
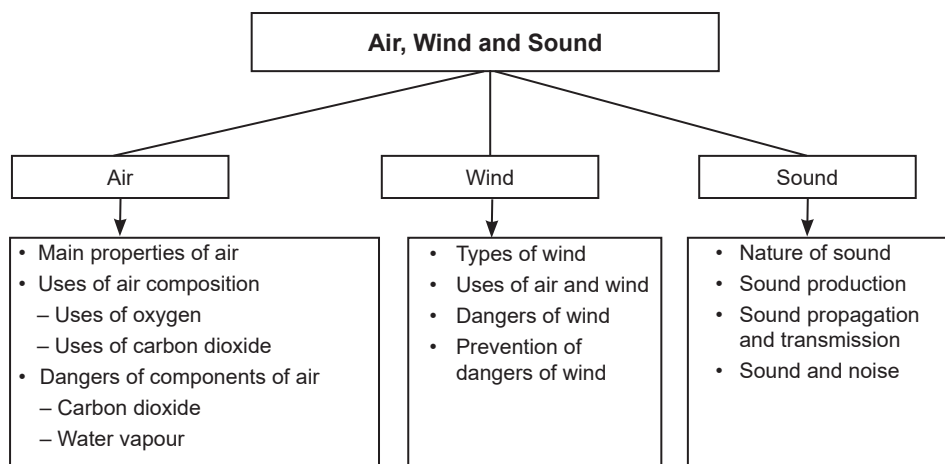
7.3 INTRODUCTION

This unit introduces the learners to:

- The main properties of air, uses of air and its composition,
- The dangers of components of air like global warming,
- Uses of air and wind, dangers of wind and prevention,
- The nature of sound, sound production, sound propagation and transmission,
- Sound and noise, damaging effects of noise and protection of ear from noise.

7.4 TEACHING AIDS

- **Visuals:** Images showing composition of air, and harmful effects of Global Warming.
- **Audio-video:** Clips showing wind, its types and dangers; clips showing propagation of sound and its transmission.
- **Powerpoint Presentations:** Presentation showing difference between sound and noise.

7.5 TEACHER'S TIP

You could start the unit by appreciating the importance of air and wind in our environment. Introduce wind as moving air. Make the learners aware of the disaster caused by strong winds. Educate them how to overcome the disaster. Talk about Oxygen and Carbon dioxide in the atmosphere. Comment on Oxygen as life support of organisms. Ask the

learners to investigate on the utility and dangers of Carbon dioxide. Make the learners aware of air pollution and its pollutants. Compare Noise and Sound in the classroom. Tell how they affect hearing. Make them aware of the dangers of Carbon monoxide and noise. Conduct activities to make them understand the dangers of these pollutants.

7.6 TEACHING METHODS

- Demonstration, group discussion and role play, and practical work.

7.7 TEACHING AND LEARNING MATERIALS

- Balloon and string,
- A beam balance, two balloons of the same size and a string,
- A syringe,
- Two candles, a matchbox and a transparent cup,
- A brick or wide stone,
- Two small animals (such as mice or lizards), a candle, a matchbox and two transparent jars,
- Millet, sorghum and a winnower,
- Drum and stick,
- 2 paper cups, a long piece of string and a nail,
- Winnower, balloons, seedling and beam balance.

7.8 LESSON PARTITION

No.	Lesson Title	Contents	Learner's Activities	Number of Periods
1.	Main Properties of Air	• Identification of the main properties of air.	• Collecting balloons, beam balance, a kit to demonstrate that air has weight, it occupies space and can be compressed.	2
2.	Composition of Air	• Explanation of the composition of air.	• Performing an experiment to prove the existence of oxygen in air and its amount.	1

(*Contd...*)

3.	Utility of Air Components in Daily Life	• Use of oxygen. • Use of carbon dioxide.	• **Investigation:** To prove the utility of Carbon dioxide for green plants: covering grass with an opaque object (like wide stone) and observe the colour of the covered grass after some days (two, four, six and ten days).	1
4.	Dangers of Components of Air	• Dangers of carbon dioxide. • Dangers of water vapour. • Dangers of carbon monoxide.	• **Investigation:** The dangers of Carbon monoxide: in a closed container containing a living animal (e.g., a small rat), burning a candle and observe. The system to be compared with a similar one which doesn't have a burning candle inside.	1
5.	Wind and its Types	• Identification of the types of wind. • Comparison of the types of winds.	• Discussing how we know it is windy by looking out a window.	1
6.	Uses of Air and Wind	• Explanation of the importance of air and wind in the environment.	• Listing and discussing all the things that learners have seen wind do. • Collecting millet, sorghum, winnower to practise and show that wind can be used in winnowing. • Collecting various samples of seedlings, plant three and do a follow up (this can be extended to many years in school).	1
7.	Dangers of Wind	• Explanation of the dangers of wind and how to prevent them.	• Visiting areas spoiled by wind to compare the effects of the wind in the environment.	1

(*Contd...*)

8.	Sound	• Explanation of the nature of sound. • Sound production. • Sound propagation and transmission. • Production of echo • Distinguishing sound and noise. • Identification of damaging effects of noise on hearing system. • Explanation on how to protect ears from noise.	• **Brainstorming:** To gain understanding of the nature of the sound. • Group discussion about the sound propagation and transmission. • **Role play:** In small groups make a devise (two boxes with a long string) and investigate the sound transmission. • In small groups use two tubes to illustrate the sound reflection. • Producing sound and noise and discussing their differences. • Discussing the damaging effects of noise. • Discussing the ways of protecting ears from noise.	5
9.	Unit Revision	• Main properties of air. • Composition of air. • Utility of air components. • Dangers of components of air. • Wind and its types. • Use of air and wind. • Dangers of wind. • Sound. • Production of echo. • Sound and noise.	• Answering unit review exercises.	1

7.9 TEACHING METHODOLOGY AND LEARNER'S ACTIVITIES

- The teacher should begin the unit by asking the learners to carry out **Activity 1** given in the Pupil's book.

Activity 1: Feeling the Presence of Air

Step 1: The teacher should ask all the learners in the class to wave their notebook across their faces.

Step 2: He/She should ask them what they feel. Let them discuss among themselves and give the answer.

- Some of the learners will answer that they feel air.

- Agreeing with their answer, the teacher will discuss that this activity shows that air is present everywhere but we cannot see it.

Lesson 1: Main Properties of Air

- The teacher should guide the learners to carry out **Activities 2 (a) to 2 (c)** given in the Pupil's book to discover the main properties of air.

Activity 2 (a): Exploring Properties of Air

Step 1: The teacher should arrange a few deflated balloons or ask the learners to bring one each from their homes.

Step 2: He/She should ask the learners to blow the balloon with their mouth.

Step 3: He/She should ask them to discuss and answer the following questions:

– *What makes the balloon inflate? Explain why.*

Step 4: Learners may reply that it is air that makes the balloon inflate.

- The teacher should discuss with the learners that air blown into the balloon occupies space. In the same way, air causes football and bicycle tubes to inflate. What does this show?

- The learners will reply that this shows that air occupies space.

Activity 2 (b): Exploring Properties of Air

Step 1: The teacher should arrange the materials such as a beam balance, two balloons of the same size and a string.

Step 2: The learners will blow the balloons.

Step 3: The teacher should ask them to tie their ends with string and place these on the two pans of the beam balance.

Step 4: He/She should ask them to observe what happens.

- Learners will observe that the beam is balanced.

Step 5: He/She should ask them to burst one balloon and observe what happens.

- Learners will observe that the pan that holds deflated balloon goes up and the other end comes down.

Step 6: The teacher should ask what it shows.

- The teacher should discuss with the learners that the inflated balloon goes down as it is heavy. It is heavy because it has air in it. This shows that air has weight.

Activity 2 (c): Exploring Properties of Air

Step 1: The teacher should ask the learners to bring a syringe.

Step 2: He/She should guide them to pull the syringe and draw 10 mL of air.

Step 3: Then he/she should ask the learners to cover its nozzle with their finger.

Step 4: He/She should ask them to push the plunger down. Then he/she should ask them what they observe.

Step 5: Learners will reply that they are able to push plunger down to some extent.

- The teacher should discuss with the learners that the air inside the syringe gets compressed to a certain extent. This shows that air can be compressed.
- After completion of **Activities 2 (a)**, **2 (b)** and **2 (c)** given in the Pupil's book, the learners conclude that air has the following properties.
  (a)   Air occupies space
  (b)   Air has weight
  (c)   Air can be compressed

Lesson 2: Composition of Air

- The teacher should guide the learners to carry out **Activity 3** given in the Pupil's book**.**

Activity 3: Experiment on Composition of Air

Step 1: The teacher should arrange a beaker, a candle and a glass jar.

Step 2: He/She should ask the learners to fix the candle on beaker and pour water into it.

Step 3: He/She should guide the learners to mark the initial level of water. He/She will let them light the candle and then cover the candle with a glass jar.

Step 4: He/She should ask the learners to record their observations.

Step 5: The learners will observe that the candle stops burning when it is covered with the jar and water rises up to fill this space.

Step 6: The teacher should guide the learners to understand that the candle extinguishes because the burning candle has used up the oxygen present inside the jar and the level of water rises to one-fifth of the glass jar because one-fifth of air is used up in the jar. This shows that oxygen is one-fifth of air.

- The teacher should further discuss with the learners that air is a mixture of gases—Nitrogen, Oxygen, Carbon dioxide, Argon and water vapour.

Lesson 3: Utility of Air Components in Daily Life

- The teacher should discuss that each component of air has some specific use.

(a) Nitrogen

Activity 4: Discussing the Use of Nitrogen

Step 1: The teacher should ask the learners to carry out the activity as per the procedure given in the Pupil's book and present a report in the class.

- After the learners present their report, discuss that if there were no Nitrogen in the air everything would burn rapidly. Nitrogen prevents rapid burning and is also used in fertilisers.

(b) Oxygen

Activity 5 (a): Exploring the Use of Oxygen

- The teacher should ask the learners to carry out the activity as per the steps given in the Pupil's book.
- The teacher should discuss that the above activity shows that oxygen is used in respiration and is also necessary for burning.

Activity 5 (b): Exploring the Use of Oxygen

- The teacher should ask the learners to carry out the activity as per the steps given in the Pupil's book.
- This activity shows that oxygen is necessary for respiration.

Activity 5 (c): Exploring the Use of Oxygen

- The teacher should ask the learners to carry out the activity as per the steps given in the Pupil's book
- This activity shows that oxygen is necessary for germination.

Activity 5 (d): Exploring the Use of Oxygen

- The teacher should ask the learners to carry out the activity as per the steps given in the Pupil's book.
- This activity shows that oxygen is necessary for combustion to take place.

- From these activities, the learners will conclude that Oxygen is used for:
  (a) Respiration
  (b) Plant germination
  (c) Combustion

(c) Argon

Activity 6: Exploring the Use of Argon

- The teacher should ask the learners: "What does the picture show?"
- The teacher should further ask "Which gas is used in it?"
- The teacher should discuss with the learners that Argon is used in light bulb.

(d) Carbon Dioxide

Activity 7 (a): Exploring the Use of Carbon Dioxide

- The teacher should ask learners the questions given in the activity.
- The teacher should discuss with the learners that plants use carbon dioxide to prepare food through a process known as photosynthesis.

Activity 7 (b): Exploring the Use of Carbon Dioxide

Step 1: The teacher should ask the learners to bring a brick or wide stone to the class.

Step 2: He/She should lead them to the school playground.

Step 3: He/She should ask them to cover some grass in the garden with a brick.

Step 4: He/She should ask them to remove the brick after two days and observe the colour of the covered grass.

Step 5: He/She should ask them to observe the colour of grass on every second day for a period of 10 days.

Step 6: He/She should ask the learners to write their observation in their notebook and discuss their findings in the class.

  - Learners will observe that the grass covered with the stone cannot receive atmospheric carbon dioxide and light. So it is unable to prepare its food and becomes pale yellow. This shows that carbon dioxide is essential for green plants.

Activity 7 (c): Exploring the Use of Carbon Dioxide

Step 1: The teacher should ask the learners to observe the picture and answer the following questions:

  – What does the picture show?
  – Why does the drink fizz up?
  – Which gas is used in its preparation?

Step 2: The teacher should discuss with the learners that the drink fizzes up because carbon dioxide present in the soft drink bottle is quickly released upon opening the bottle.

This shows that carbon dioxide is used in industrial beverages.

Activity 7 (d): Exploring the Use of Carbon Dioxide

Step 1: The teacher should ask the learners to observe the picture and answer the following questions:

– What does the picture show?

– Which gas is used in the fire extinguisher?

Step 2: The teacher should discuss with the learners that carbon dioxide gas is used in fire extinguishers to put the fire off.

- The teacher should discuss with the learners that carbon dioxide has the following uses:

(a) Green plants use carbon dioxide to make their food.

(b) Carbon dioxide is used for making industrial beverages.

(c) Carbon dioxide is used in fire extinguishers to put the fire off.

(e) Water vapour

Activity 8: Exploring the Use of Water Vapour

- The teacher should ask learners the questions given in the activity.
- The teacher should discuss with the learners that water vapour forms clouds and then falls as rain on earth. So, it is essential for life processes on earth.

Lesson 4: Dangers of Components of Air

(a) Carbon Dioxide and Water Vapour

- The teacher should discuss with the learners the dangers of air components such as carbon dioxide and water vapour as given in the Pupil's book.

(b) Carbon Monoxide

- The teacher should guide the learners to carry out **Activity 9** given in the Pupil's book to demonstrate danger of carbon monoxide gas.

Activity 9: Exploring the Dangers of Carbon Monoxide

Step 1: The teacher should ask the learners to take a small rat and keep it in the first jar.

Step 2: He/She should ask them to take another rat and keep it in the second jar.

Step 3: He/She should ask them to place a burning candle in the second jar and cover both the jars with their lids.

Step 4: He/She will ask them what difference they observe.

- Learners will observe that the rat in the second jar gets unconscious. This is because the burning candle fills the jar with carbon monoxide. It shows that carbon monoxide is dangerous.
- After completion of activity, the teacher should discuss with the learners that breathing carbon monoxide gas can cause headache, vomiting, nausea and loss of consciousness. Charcoal stoves are a source of carbon monoxide and thus one should never cook food inside a closed room.

Prevention from Global Warming

- The teacher should discuss with the learners the steps to be taken to prevent global warming as given in the Pupil's book.

Lesson 5: Wind and its Types

- The teacher should ask the learners to carry out **Activities 10** and **11** given in the Pupil's book.

Activity 10: Discovering the Existence of Wind

Step 1: The teacher should arrange a candle and place the burning candle in the school verandah.

Step 2: He/She should ask the learners what they observe.

- Learners will answer that the candle flame is disturbed.

Step 3: He/She should ask what makes the candle flame disturbed.

- Learners will answer that moving air disturbs the flame.
- The teacher should discuss with the learners that the moving air is called wind. It blows from a particular direction.

Activity 11: Discussion on Nature and Speed of Wind Movement

Step 1: The teacher should ask the learners to discuss what type of wind is blowing by looking out of the window and explain its nature.

Step 2: He/She should ask each learner to list the differences between the types of wind.

- The teacher should discuss with the learners that movement of air depends on the change in pressure and temperature of the atmosphere. Winds may be **light**, **breeze** or **stormy.**
- He/she should ask the learners to read the description of the three types of winds as given in the Pupil's book.

Lesson 6: Uses of Air and Wind

- The teacher should discuss with the learners that air and wind help animals and humans in many ways.

Activity 12: Flying Birds

Step 1: The teacher should ask the learners–What does the picture show?

Step 2: He/She should ask them–What helps birds to fly?

- After the learners present their views, discuss with them that air helps the bird to fly.

Activity 13: Discussing Breathing Factors

Step 1: The teacher should ask the learners to hold their breath for some time.

Step 2: He/She should ask them how they feel and why.

- Learners will feel uneasy. The teacher should discuss that this happens because air is necessary for breathing.

Activity 14: Separating Components of Heterogeneous Mixtures

Step 1: The teacher should ask the learners to collect millet, sorghum and a winnower.

Step 2: He/She should ask the learners to perform activity as per the steps given in the Pupil's book.

- The teacher should discuss with the learners that this process is called winnowing. It is done with the help of wind to separate lighter husk particles from heavier grains like corn, sorghum and millet.

Activity 15: Drying Clothes

Step 1: The teacher should ask the learners to take two wet clothes.

Step 2: Ask them to hang them in open.

Step 3: Ask them what they observe after two hours.

- Learners will observe that the clothes become dry.
- Discuss with the learners that the moving air helps the clothes to dry.

Activity 16: Discussion on Factors of Rain Distribution

Step 1: The teacher should ask the learners the following questions:

- What does the picture show?
- What helps the clouds to move for rain distribution.

Step 2: He/She should discuss with the learners that moving air helps the clouds to move for rain distribution.

Activity 17: Discussing the Sail Boat

Step 1: The teacher should ask the learners the following questions:

- What does the picture show?
- What helps the boat to sail on water?

Step 2: He/She should discuss with the learners that moving air helps the boat to sail on water.

Activity 18: Discussing the Windmill

Step 1: The teacher should ask the learners the following questions:

- What does the picture show?
- What helps the wheel of the windmill to rotate?

Step 2: He/She should discuss with the learners that moving air rotates the windmill to generate electricity.

Lesson 7: Dangers of Wind

- The teacher should discuss with the learners that air helps us in many ways but sometimes it is very dangerous.

Activity 19: Discussing the Dangers of Wind

- The teacher should guide the learners to carry out the activity themselves as per the steps given in the Pupil's book.
- Thereafter, the teacher should discuss with the learners the dangers of winds.
- He/She should ask the learners to add some more dangers to the list given in the Pupil's book.

Field Trip

- The teacher should organize a visit to an area spoiled by the wind.
- He/She should ask the learners to observe and list the effects of wind on environment.

Prevention of Dangers of Wind

Activity 20: Preventing Dangers of Wind

Step 1: The teacher should ask the learners–What does the picture show?

Step 2: Ask them–Why does the boy plant trees around his house?

- The teacher should discuss with the learners that the boy plants trees around his house. He does so because trees block the wind speed and protect the house from damage.
- The teacher should further discuss with the learners about the different ways to prevent dangers of wind.

Project Work

Step 1: The teacher should ask the learners to collect various samples of seedlings.

Step 2: He/She should ask the learners to plant these and do the follow up.

Step 3: He/She should ask them to continue this process for many years.

Lesson 8: Sound

- The teacher should introduce the concept of sound by guiding the learners to carry out **Activities 21–29** given in the Pupil's book.

Activity 21: Differentiating Sources of Sound

Step 1: The teacher should ask the learners to go outside the class.

Step 2: He/She should ask them to hear different sounds produced in their surroundings.

Step 3: He/She should ask them to list the source of each sound they hear.

Step 4: He/She should ask them to imitate these sounds.

Step 5: Thereafter, he/she should guide them to ask their friends to tell what sound they are making.

- After completion of the activity, the teacher should discuss with the learners that sound is a form of energy and it comes from all around us such as from people talking, radios playing and airplanes flying.

(a) Sound Production

- The teacher should discuss with the learners that sounds may be soft or loud, high or low, and pleasant or unpleasant. Still, all kinds of sounds are made in the same way.

Activity 22: Exploring the Causes of Sound

Step 1: The teacher should arrange a drum.

Step 2: He/She should ask one of the learners to come in front of the class and hit the drum.

Step 3: He/She should put some tiny pieces of paper on it and ask them what they observe.

- Do the tiny pieces of paper move?
- What makes these pieces of paper move?
- The teacher should guide the learners to understand when they hit the drum, its membrane moves back and forth very quickly. This fast movement is called vibration. It makes the sound. The vibrations cause paper pieces to jump on the membrane.

(b) Nature of Sound

- The teacher should discuss with the learners the concept of nature of sound.

Activity 23: Exploring the Nature of Sound

- The teacher should guide the learners to carry out the activity as per the procedure given in the Pupil's book to demonstrate that sound needs medium to travel.
- He/She should further discuss with the learners the other natures of sound as given in the Pupil's book.

(c) Sound Propagation and Transmission

- The teacher should discuss with the learners sound propagation and transmission by guiding them to carry out **Activities 24, 25(a), 25(b)** and **25(c)** given in the Pupil's book.

Activity 24: Exploring the Propagation of Sound

Step 1: The teacher should arrange for a music system in the class.

Step 2: He/She should ask a learner to put hand on its speaker when it is playing.

- The learner will feel vibration of the speaker. The teacher will explain that this back and forth movements make the sound travel towards the ears.

Activity 25 (a): Exploring the Medium of Sound Transmission

Step 1: The teacher should guide the learners to bring two paper cups.

Step 2: He/She should ask them to make a hole at the bottom of each cup.

Step 3: He/She should ask them to insert a string in both the holes and tie a knot.

Step 4: He/She should ask one learner to hold a cup to his/her ear.

Step 5: He/She should give the other cup to another learner.

Step 6: He/She should ask the first learner to speak into his/her cup. Can the second learner hear him/her?

Step 7: The second learner will be able to hear. Ask them to try it the other way round.

- This activity shows that **sound transmits through solids**.

Activity 25 (b): Exploring the Medium of Sound Transmission

Step 1: The teacher should ask the learners to go to the school playground and talk to each other.

Step 2: He/She should ask them whether they can hear each other.

- Discuss with the learners that this activity shows that **sound transmits through air**.

Activity 25 (c): Exploring the Medium of Sound Transmission

- The teacher should guide the learners to carry out the activity as per the procedure given in the Pupil's book to demonstrate that **sound transmits through liquid.**

- Learners will conclude that sound can transmit through solids, air and liquids.

(d) Production of Echo: Reflection of Sound

- The teacher should guide the learners to carry out **Activity 26** given in the Pupil's book.

Activity 26: Producing Echo

Step 1: The teacher should take the learners to a hilly area and ask them to shout loudly.

Step 2: He/She should ask them what they hear after a while.

Step 3: Learners will reply that they hear a faint sound similar to original sound after sometime.

- The teacher should discuss with the learners that sound hits the solid surface and reflects around. This reflection of sound waves is called **echo**.

(e) Sound and Noise

- The teacher should introduce this lesson by guiding the learners to carry out **Activity 27** given in the Pupil's book.

Activity 27: Discussing the Nature of Sound

Step 1: The teacher should arrange a tuning fork, a hammer and a metal box.

Step 2: He/She should ask one learner to strike the tunning fork with a hard object.

Step 3: He/She should ask the learner to strike a hammer on a metal box and observe the sound it produces.

Step 4: He/She should ask them whether they feel any difference.

Step 5: He/She should ask them to discuss their observation in the class.

- The teacher should discuss with the learners that the sounds which are pleasant to hear are **pure** or **musical sounds**. Musical sounds are produced by the regular vibrations. All musical instruments produce regular vibrations, for example, strings of guitar and violin.

- The sounds which are unpleasant to hear are called noise. Irregular vibrations cause **noise**. Grinding machines and crackers produce noise.

(f) Damaging Effects of Noise

- The teacher should ask the learners to carry out **Activity 28** given in the Pupil's book.

Activity 28: Effects of Noise on Health and Environment

Step 1: The teacher should arrange to take the class on a field visit to a nearby factory or a stone crusher.

Step 2: He/She should ask them to observe what type of sound each machine produces.

Step 3: He/She should ask them to list some effects of such sounds on our health and environment in their notebook.

- The teacher should discuss with the learners that we hear sound and noise through our ears.
- He/She should discuss the harmful effects of prolonged exposure to noise as given in the Pupil's book.

(g) Protection of Ears from Noise

- The teacher should guide the learners to carry out **Activity 29** given in the Pupil's book.

Activity 29: Protection of Ears from Noise

Step 1: The teacher should ask the learners–What does the picture show?

Step 2: Ask them–Why is the factory worker wearing earmuffs?

- The teacher should discuss with the learners that the factory worker is wearing earmuff. He wears earmuffs to protect his ears from noise.

The Way of Protecting Ears from Noise

- The teacher should discuss with the learners the ways of protecting ears from noise as given in the Pupil's book.

Lesson 9: Unit Revision

- The teacher should ask questions from the unit review exercises covering all the lessons to assess the competences achieved by the learners.

7.10 ADDITIONAL CONTENT FOR THE TEACHER

The teacher can demonstrate these activities in the class.

Activity A-1

Aim: To make a "Sound Gun"

You will need:

- A cardboard tube
- Matches
- A nail
- A dish
- Plastic wrap
- Some sand
- A birthday-cake candle

Procedure:

Take a cardboard tube and cover its both ends with plastic wrap. Ensure that the plastic is stretched tight. Using the nail make a small hole in the middle of the plastic at one end. Put some sand in the dish and stand the candle upright in the sand. Light the candle. Hold the "sound gun" so that the hole is about 2 centimetres away from the candle flame. Tap the plastic at the other end of the tube. What happens to the flame? Try to explain your observations.
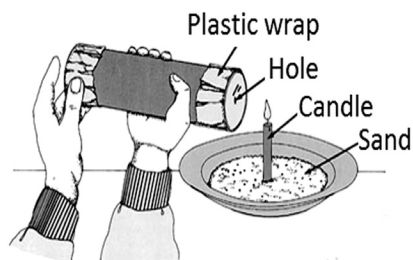
Activity A-2

Aim: To show reflection of sounds around

You will need:

- Two long cardboard tubes
- A ticking watch
- A wall

Procedure:

Hold a tube at an angle to the wall with the ticking watch at the other end. Ask a student to hold the other tube to his/her ear and aim it at the same spot on the wall as your tube is pointing. Can he/she hear anything?

What does this tell you about what is happening to the sound waves when they hit the wall?

7.11 WEB LINKS FOR CONTENT ENRICHMENT

- http://www.bcairquality.ca/101/what-is-air.html
- http://windeis.anl.gov/guide/basics/
- http://www.physicsclassroom.com/class/sound
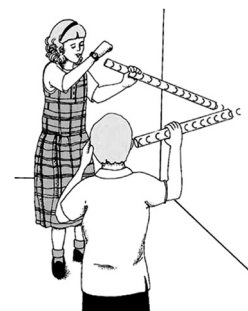
7.12 SOLUTIONS TO UNIT REVIEW EXERCISES

I. **Fill in the blanks with the correct options:**

   1. (a)   **2.** (a)

   3. (b)   **4.** (b)

   5. (a)

II. **State whether the following statements are true or false:**

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

III. **Match the following:**

1. (e)
2. (a)
3. (d)
4. (b)
5. (c)

IV. **Answer the following questions briefly:**

1. The main properties of air are: It occupies space, it has weight and it can be compressed.

2. Air is a mixture of various gases. It consists of the following gases:
   - Nitrogen 78%,
   - Oxygen 21%,
   - Rare gases like Argon 0.97%,
   - Carbon dioxide 0.03%.

   Besides gases, dust particles, water vapour and smoke are also present.

3. **(a)** Uses of oxygen:
   - (i) It is essential for respiration.
   - (ii) It is also necessary for combustion or burning.

   (b) Uses of carbon dioxide:
   - (i) Carbon dioxide is useful for photosynthesis.
   - (ii) It is useful for making industrial beverages like soda water.

4. Different types of wind are light wind, breeze wind and storm wind.

5. The main uses of air and wind are:
   - Moving air helps the wheel of wind mill to generate electricity.
   - It helps the birds to fly in the sky.
   - It helps clouds to move for rain distribution.
   - Moving air helps to dry clothes.

6. When we shout near a hilly area, or in a big empty room a faint sound similar to the original sound is heard after some time. Sound hits the solid surface and reflects to the listener. This reflection of sound waves is called **echo**.

7. The following are the nature of sound wave:
   - Sound is a form of energy, just like electricity and light.
   - It is always produced by a source.
   - It needs a medium to travel. For example, sound travels in solid, liquid and gas.
   - Sound waves cannot be transmitted through vacuum.
   - Speed of sound varies in all three media.
8. To protect our ears from noise, we must:
   - Stay away from noisy places.
   - Wear earmuffs.
   - Turn the volume down and get used to listening to quieter sounds.
   - Keep ourself away from noises caused due to fireworks.
   - Make people aware of the hazards of noise.

9. (a) **Differences between breeze and storm**

Breeze	Storm
Wind with soothing feeling on a warm day is called breeze. It blows at a certain speed.	When wind blows very fast, it is called storm. A storm can uproot trees and blow away temporary houses. It can also damage bird's nests, sheds, and crops. We must not go out of our homes during a storm.

(b) Differences between musical sound and noise

Musical Sound	Noise
The sounds which are pleasant to hear are pure or musical sounds. Musical sounds are produced by regular vibrations. All musical instruments produce regular vibrations, for example, strings of guitar and violin.	The sounds which are unpleasant to hear are called noise. Irregular vibrations produce noise. Grinding machine, hammer, motor vehicles and crackers produce irregular vibrations.

V. **Complete the crossword puzzle using the clues below:**

Across		**Down**	
2.	Vibration	1.	Air
4.	Echo	2.	Vacuum
5.	Wind	3.	Oxygen

7.13 ASSESSMENT METHODS

Use observation technique, question answer technique and demonstration technique to assess the learners achievement of learning objectives.

7.14 ASSESSMENT

1. Which gas supports burning?
2. Living things need nitrogen to make fats. (True/False)
3. What is the use of carbon dioxide in plants?
4. …………….. is produced during evaporation or boiling of water. (Ice/Water vapour)
5. Name a poisonous gas.
6. Write one difference between light wind and breeze.

Answers

1. Oxygen
2. False
3. Plants use it to make food
4. Water vapour
5. Carbon monoxide
6. The soft and pleasant movement of air is called light wind. Wind with soothing feeling on a warm day is called breeze.

UNIT 8—SOIL

8.1 LEARNING OBJECTIVES

At the end of this unit, the learners should be able to:

Knowledge and Understanding	Skills	Attitudes and Values
• Define soil. • Identify types of soil. • Identify different components of soil. • Explain the use of soil. • Describe the characteristics of fertile soil. • Identify methods and techniques of erosion prevention.	• Recognize suitable soil for cultivation. • Match the type of soil with its use. • Apply various methods and techniques to stop soil erosion.	• Display awareness of the socio-economic importance of soil. • Show concern about good soil management. • Show concern and advocacy about environmental protection issues. • Show concern about dangers of soil erosion.

8.2 CONTENTS

```
                                   Soil
        ┌──────────┬──────────┬──────┴──────┬──────────────┬──────────┐
  Types of soil  Composition  Uses of soil  Characteristics  Soil erosion
                  of soil                     of soil
        │           │           │               │              │
   • Loam      • Air       • For          • Easy to       • Agents
   • Clay      • Water       crops          dig           • Causes
   • Sand      • Moisture  • Bricks       • Well          • Types
               • Clay                       aerated       • Prevention
               • Sand
               • Stone
               • Humus
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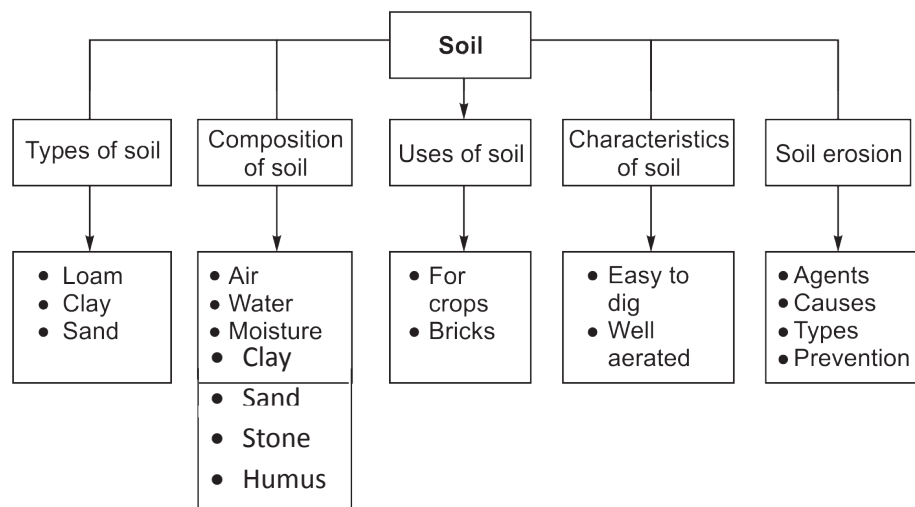
8.3 INTRODUCTION

- This unit introduces the learners to soil. The topmost layer of earth's surface is called soil.
- This unit also introduces the learners to the types of soil such as loam, clay and sand, its composition, uses and characteristics.
- This unit also gives an idea about soil erosion, agents and causes of soil erosion and how to prevent soil erosion.

8.4 TEACHING AIDS

- **Visuals:** Picture of different types of soil.
- **Audio-video:** Clips showing causes and types of soil erosion including their prevention.

8.5 TEACHER'S TIP

You could start the unit by defining soil. Soil is the topmost layer of the earth's surface. Arrange a field trip for the learners. Make them understand the use of each type of soil. Make them aware of the fertile soil used in agriculture. Teach them about good soil management practices and how they can increase crop production. Giving relevant examples explain why soil protection is necessary. Also emphasise soil erosion. Help them understand how a fertile land is converted into a desert due to soil erosion.

8.6 TEACHING METHODS

Brainstorming, short lecture technique, group discussion technique, observation technique, think pair share technique, drawing technique, demonstration technique, field visit, site visit and practical work.

8.7 TEACHING AND LEARNING MATERIALS

- Magnifying glass and soil
- Soil and jar
- Transparent bottle
- Different samples of soil

8.8 LESSON PARTITION

No.	Lesson Title	Contents	Learner's Activities	Number of Periods
1.	Definition of Soil	• Definition of Soil	• Writing definition of soil in their notebook.	1
2.	Types of Soil	• Identification of types of soil.	• Observing various samples of soil collected from different sites, labelling them according to their characteristics.	1
3.	Composition of Soil	• Identification of different components of soil.	• Doing practical activities to identify different components of soil.	2
4.	Uses of Soil	• Uses of different types of soils.	• Field visit in school surrounding to investigate the suitable use of each type of soil.	2
5.	Characteristics of Suitable Soil for Cultivation	• Description of the characteristics of fertile soil.	• To carry out an investigation on the characteristics of fertile soil.	1
6. 7.	Soil Erosion Agents of Soil Erosion	• Definition of soil erosion • Identification of different agents of soil erosion	• Pouring water on bare soil to show the process of soil erosion. • To carry out an activity to show the effect of water on soil erosion.	1
8.	Causes of Soil Erosion	• Identification of different causes of soil erosion	• Discussing various causes of soil erosion in groups.	1
9.	Types of Soil Erosion	• Identification of different types of soil erosion.	• Visiting an area where vegetation has been removed after rainfall.	1
10.	Prevention of Soil Erosion	• Identification of methods of techniques of erosion prevention	• Visiting farms to gain experience on how to prevent and control soil erosion. • Practical work to apply measures for preventing and controlling soil erosion.	1

(*Contd...*)

11.	Unit Revision	• Soil and its types • Composition of soil • Uses of soil • Fertile soil • Soil erosion	• Answering unit review exercises.	1

8.9 TEACHING METHODOLOGY AND LEARNER'S ACTIVITIES

- The teacher should initiate the topic by asking the learners to carry out **Activity 1** given in the Pupil's book.

Activity 1: Preparing a Recipe for Soil

Step 1: The teacher should ask the learners to mix tiny chips of rocks, dry leaves and water together.

Step 2: He/She should ask them to add bits of dried up caterpillars' skin, birds' feathers and air.

Step 3: He/She should ask them if they know what is this recipe for.

Step 4: He/She should tell them that this is a recipe for soil.

Lesson 1: Definition of Soil

- The teacher should discuss with the learners the definition of soil given in the Pupil's book.

Lesson 2: Types of Soil

- The teacher should ask the learners to perform **Activity 2** given in the Pupil's book to observe different types of soil.

Activity 2: Exploring the Types of Soil

Step 1: The teacher should ask the learners to collect samples of soil from places like lake side, farm and a construction site.

Step 2: He/She should ask them to observe the colour, size and the feel of different soil samples.

Step 3: He/She should ask them to record their observations in Table 1 given in the Pupil's book.

- After completion of the activity, the teacher should discuss with the learners that there are three main kinds of soil–**Loam, Clay and Sand.**
- He/She should discuss with the learners the characteristics of the three types of soil as given in the Pupil's book.

Lesson 3: Composition of Soil

- The teacher should ask the learners to perform **Activity 3** given in the Pupil's book.

Activity 3: How to Identify Components of Soil

- The teacher should ask the learners to carry out the activity by following the steps given in the Pupil's book.
- After completion of the activity, the teacher should discuss with the learners that soil has the following components:
    1. Air
    2. Moisture or water
    3. Clay, sand, stones and humus.

Lesson 4: Uses of Soil

- The teacher should ask the learners to carry out **Activity 4** given in the Pupil's book to investigate suitable use of each type of soil.

Activity 4: Uses of Soil

- The teacher should ask the learners to carry out the activity by following the steps given in the Pupil's book.

Lesson 5: Characteristics of Suitable Soil for Cultivation

- The teacher should ask the learners to carry out **Activity 5** given in the Pupil's book.

Activity 5: Exploring the Characteristics of Different Types of Soil

Step 1: The teacher should guide the learners to carry out the activity as per the procedure given in the Pupil's book.

Step 2: Learners will conclude that clayey soil is suitable for cultivation as it has high water-holding capacity.

- Further, the teacher should discuss with the learners the characteristics of fertile soil.

Lesson 6: Soil Erosion

- The teacher should introduce the lesson by guiding the learners to perform **Activity 6** given in the Pupil's book.

Activity 6: Showing Process of Soil Erosion

Step 1: The teacher should ask the learners to take some garden soil and place it on a flat surface.

Step 2: He/She should ask them to take a watering can filled with water.

Step 3: He/She should ask them to pour water on the soil from above.

Step 4: He/She should ask them to note the observation.

- Learners will observe that when water is poured on the soil, it washes away some soil.
- The teacher should discuss with the learners that the process of carrying away of soil by wind, water or other agents is called **soil erosion**.
- He/She should further discuss that soil erosion reduces the fertility of soil.

Lesson 7: Agents of Soil Erosion

- The teacher should discuss with the learners that the factors that are responsible for soil erosion are called agents of soil erosion.

(a) Water

Activity 7: Showing the Effect of Water on Soil Erosion

- The teacher should guide the learners to perform the activity as per the procedure given in the Pupil's book.
- He/She should discuss with the learners that when water runs over the soil, it carries away the topsoil with it.

(b) Wind

- The teacher should discuss with the learners that strong wind carries away loose and dry soil particles distant places.

Lesson 8: Causes of Soil Erosion

- The teacher should ask the learners to carry out **Activity 8** given in the Pupil's book.

Activity 8: Discussing the Causes of Soil Erosion

Step 1: The teacher should ask the learners to discuss various causes of soil erosion.

Step 2: He/She should ask the learners to make a list of these.

Step 3: He/She should ask them to compare their list with that of others.

- After completion of the activity, the teacher should discuss with the learners the different causes of soil erosion—**Deforestation**, **Overgrazing** and **Burning of bushes or bush fires.**

Lesson 9: Types of Soil Erosion

- The teacher should ask the learners to carry out **Activity 9** given in the Pupil's book.

Activity 9: Exploring the Types of Soil Erosion

Step 1: The teacher should ask the learners to visit an area, where vegetation has been removed, after a heavy rainfall.

Step 2: He/She should ask them to observe the various types of soil erosion.

Step 3: He/She should ask them to make a list of these in their notebooks.

- After completion of the activity, the teacher should discuss with the learners the four types of soil erosion—**Splash erosion**, **Sheet erosion**, **Rill erosion** and **Gully erosion**.

Lesson 10: Prevention of Soil Erosion

- The teacher should ask the learners to carry out **Activity 10** given in the Pupil's book.

Activity 10: Preventing Soil Erosion

Step 1: The teacher should ask the learners to observe the pictures given in the activity.

Step 2: He/She should ask the learners to tell what they observe in each picture.

- The teacher should tell the learners that the pictures show various methods to prevent soil erosion.

- He/She should discuss with the learners that Picture (A) shows Afforestation, (B) shows Soil Cover, (C) shows Shelter Belts and (D) shows Terrace or Step Farming.

- He/She should further discuss in detail these four methods of preventing soil erosion as given in the Pupil's book.

Lesson 11: Unit Revision

- The teacher should ask questions from the unit review exercises covering all lessons to assess the competences achieved by the learners.

8.10 ADDITIONAL CONTENT FOR THE TEACHER

The teacher can demonstrate this activity in the class.

Activity A-1

Using compost to improve soil fertility.

Create small compost bags that the learners can observe using re-sealable plastic bags. Put air holes in the bags. Ask the learners to fill the bags with moist soil and kitchen scraps.

Close the bags up and observe for a few weeks, shaking them now and then. When the compost is ready, let the learners use it to grow plants of their own by adding seeds and watching them sprout.

8.11 WEB LINKS FOR CONTENT ENRICHMENT

- https://en.wikipedia.org/wiki/Soil
- ec.europa.eu

8.12 SOLUTIONS TO UNIT REVIEW EXERCISES

I. **Fill in the blanks with the correct options:**

   1. (b)   **2.** (b)   **3.** (b)   **4.** (c)

II. **State whether the following statements are true or false:**

   1. True   **2.** False   **3.** False   **4.** True

   5. False

III. **Match the following:**

   1. (b)   **2.** (c)   **3.** (a)

IV. **Answer the following questions briefly:**

   1. The topmost layer of the earth's surface is called soil.

   2. Different types of soil are loam, clay and sand.

   3. Soil contains air, water or moisture, clay, sand, stone, dead plants and animal remains.

   4. (a) *Loam* contains good amount of humus. It is the best type of soil for plant growth.

      (b) *Clay* is used for making bricks, toys, tiles, pottery and many other articles. Vegetables such as tomato and pepper grow well in this soil.

      (c) *Sandy* soil when properly watered, is useful for some crops. Coconut, cashewnut, dates and groundnut grow well in sandy soil. Sand is also used to make glass.

   5. The three animals are rabbit, ant and earthworm.

   6. Some characteristics of fertile soil are:

      (a) It should have adequate amount of humus.

      (b) It should have high water-holding capacity.

      (c) It should be well aerated.

   7. Wind is an agent of soil erosion.

   8. Different types of soil erosion are:

(a) Splash erosion or raindrop erosion

(b) Sheet erosion

(c) Rill erosion

(d) Gully erosion

9. Three methods of preventing soil erosion are:

(a) Afforestation

(b) Soil cover

(c) Shelter belts

V. **Complete the crossword puzzle using the clues below:**

Across		**Down**	
2.	Soil	**1.**	Loam
4.	Clay	**3.**	Sand
5.	Humus		

8.13 ASSESSMENT METHODS

Use observation technique, question answer technique, and demonstration technique to assess the learners' achievement of learning objectives.

8.14 ASSESSMENT

1. …..........…….. is chiefly a mixture of sand and clay. (Loam/Sand)
2. Clay is made up of very fine particles. (True/False)
3. Name the three kinds of soil.
4. What do you understand by soil erosion?
5. Name two agents of soil erosion.
6. How does strong wind cause soil erosion?

Answers

1. Loam
2. True
3. Loam, clay and sand
4. This process of carrying away of soil by wind, water or other agents is called soil erosion.
5. Water and air
6. Strong wind blows away the topsoil with it and causes soil erosion.

UNIT 9—ANIMALS

9.1 LEARNING OBJECTIVES

At the end of this unit, the learners should be able to:

Knowledge and Understanding	Skills	Attitudes and Values
• Name the major groups of animals. • State the major classes of animals. • Give respiration mode of animals. • Describe the different ways of animal locomotion. • Identify different modes of animal feeding. • Identify different modes of animal reproduction.	• Differentiate the external features of animals. • Make patterns of different animals basing on how they move, feed, respire, and reproduce in our environment.	• Display awareness of social-economical role of animals in the society. • Show concern about protecting animals' lives in our environment as a way to maintain wild life. • Develop curiosity and inquisitiveness spirit towards animals.

9.2 CONTENTS

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Animals classification according to the backbone	Animals classification according to the respiration mode	Animals classification according to the locomotion mode	Animals classification according to the feeding mode	Animals classification according to the reproductive mode

• Vertebrates
  - Mammals
  - Birds
  - Fish
  - Reptiles
  - Amphibians
• Invertebrates
  - Insects
	• Breathing through
	  - lungs
	  - skin
	  - gills
	  - spiracles
		• Flying
		• Crawling
		• Hopping
		• Walking
		• Swimming
			• Carnivores
			• Insectivores
			• Herbivores
			• Omnivores
			• Granivores
			• Rodents
				• Animals that lay eggs
				• Animals that give birth to their young ones

9.3 INTRODUCTION

- This unit introduces the learners to the classification of animals according to the backbone, such as vertebrates and invertebrates. The five most common well known classes of vertebrates such as mammals, birds, reptiles, amphibians and fish, and their external and internal features have also been discussed in this unit.

- This unit also introduces the learners to invertebrates, animals classification according to their respiration mode, locomotion mode, feeding mode and reproductive mode.

9.4 TEACHING AIDS

- **Visuals:** Images showing different mammals, birds, reptiles, amphibians and fish.

9.5 TEACHER'S TIP

* You could start the unit by discussing the characteristics of animals. Different animals move, feed and reproduce differently. Inform the learners that animals are classified on the basis of these characteristic features only. Use illustrative charts to explain different characteristics. Explain the importance of maintaining wildlife for our environment. Engage the learners in observing animals in and around. This would develop feeling in them for the creatures. This would also help them being curious about their behaviour and role in environment.

9.6 TEACHING METHODS

* Brainstorming, short lecture technique, group discussion technique, observation technique, think pair share technique, drawing technique, demonstration technique, field visit, site visit, practical work and role play.

9.7 TEACHING AND LEARNING MATERIALS

* Two insects and two glasses of water
* Variety of animals, containers and water
* Wall charts and flash cards.

9.8 LESSON PARTITION

No.	Lesson Title	Contents	Learner's Activities	Number of Periods
1.	Classification of Animals According to the Backbone	• Identification of Vertebrates and Invertebrates	• **Group work:** Classification of animals in our surroundings and group them according to their major characteristics.	1
2.	Classes of Vertebrates and Invertebrates	• Classes of vertebrates: Mammals, birds, reptiles, amphibious and fish. • Classes of invertebrates: Insects	• Group work to discuss about the respiration mode of vertebrates.	1

(Contd…)

3.	Classification of Animals According to the Respiration Mode	• Animals respiring through lungs • Animals respiring through gills • Animals respiring through skin • Animals respiring through spiracles • Animals respiring through lungs and skin	• Carrying out an activity to demonstrate that an insect breathes through spiracles which are located near the abdomen. • Discussing in groups about the respiration of vertebrates.	3
4.	Classification of Animals According to the Locomotion Mode	• Flying animals • Crawling animals • Jumping animals • Walking animals • Swimming animals	• Visiting the school surroundings, discuss how animals move. • Role play to simulate animals' locomotion. (Crawl, walk , fly etc.)	2
5.	Classification of Animals According to the Feeding Mode	• Herbivores • Insectivores • Carnivores • Omnivores • Granivores • Rodents	• Visiting the school surroundings, discussing how animals feed.	2
6.	Classification of Animals According to their Reproductive Mode	• Animals laying egg • Animals producing young ones alive	• Visiting the school surroundings, discussing how animals reproduce.	2

(*Contd…*)

7.	Unit Revision	• Classification of animals according to backbone, respiration mode, locomotion mode, feeding mode and reproductive mode.	• Answering unit review exercises.	1

9.9 TEACHING METHODOLOGY AND LEARNER'S ACTIVITIES

- The teacher needs to make the learner familiar with the different kinds of animals in the animal world.
- The teacher should show the learners various pictures and slides of different kinds of animals.

Lesson 1: Classification of Animals According to the Backbone

- The teacher should ask the learners to carry out **Activity 1** given in the Pupil's book.

Activity 1: Classifying Animals According to Backbone

Step 1: The teacher should ask the learners to observe the pictures of animals given in the Pupil's book.

Step 2: He/She should ask the learners which animals according to them have a backbone and which of them do not.

- After listening to answers of the learners, the teacher should tell the learners that animals such as cows, cats, frogs, pigeons and humans have a backbone. They are vertebrates. Other animals such as earthworms, grasshoppers, houseflies and butterflies do not have a backbone. They are invertebrates.

Lesson 2: Classes of Vertebrates and Invertebrates

A. Vertebrates and their Classes

- The teacher should ask the learners to do **Activity 2** given in the Pupil's book.

Activity 2: Classifying the Vertebrates According the their Major Characteristics

Step 1: The teacher should ask the learners to observe the pictures of animals given in the Pupil's book.

Step 2: He/She should ask the learners to answer the following questions:

      (i)   Are these animals vertebrates?

      (ii)   What are their major characteristics?

Step 3: He/She should ask the learners to group these animals according to their major characteristics.

- After completion of the activity, the teacher should tell that these all are vertebrates and discuss with the learners the major characteristics of vertebrates as given in the Pupil's book.

- Further, discuss with the learners the five well-known classes of vertebrates: **Mammals**, **birds**, **reptiles**, **amphibians** and **fish**.

(a)   Mammals

- The teacher should ask the learners to do **Activity 3** given in the Pupil's book.

Activity 3: Carrying out Major Characteristics of Mammals

Step 1: The teacher should ask the learners to observe the pictures and answer the questions asked in the activity.

Step 2: He/She should tell the learners that these are mammals and discuss the characteristics of mammals given in the Pupil's book.

Cow

- The teacher should discuss with the learners that cow is the best example of mammals.

- He/She should ask the learners to carry out **Activities 4** and **5** given in the Pupil's book.

External Features of a Cow

Activity 4: Identifying External Body Parts of a Cow

Step 1: The teacher should ask the learners to identify the external body parts of a cow and label them in their notebook.

Step 2: He/She should discuss with the learners the external body parts of a cow as given in the Pupil's book.

Internal Features of a Cow

Activity 5: Discussing the Functions of Internal Organs of a Cow

Step 1: The teacher should ask the learners to observe the internal organs of a cow, on a wall chart.

Step 2: He/She should ask them to discuss the functions of each organ.

Step 3: He/She should ask them to make a report on it and present to their class teacher.

- Thereafter, the teacher should discuss with the learners the internal organs of a cow and their respective functions as given in the Pupil's book.

(b) Birds

The teacher should ask the learners to do **Activity 6** given in the Pupil's book.

Activity 6: Discussing the Major Characteristics of Birds

Step 1: The teacher should show the learners the pictures of birds given in the Pupil's book.

Step 2: He should ask the following questions:

- How do these animals make their young ones?
- What is their body made up of ?
- What are these animals called?

- After listening to the answers of the learners, the teacher should discuss with the learners that these animals are called birds.

- He/She should discuss with the learners the characteristic features of birds as given in the Pupil's book.

Hen

- The teacher should discuss that hen is the best example of a bird.

External Features of a Hen

Activity 7: Identifying External Features of a Hen

Step 1: The teacher should ask the learners to identify the external body parts of a hen and label them in their notebook.

Step 2: He/She should discuss the main external body parts of a hen and their functions as given in the Pupil's book.

Internal Features of a Hen

Activity 8: Discussing the Functions of Internal Organs of a Hen

Step 1: The teacher should ask the learners to observe the internal organs of a hen on a wall chart.

Step 2: He/She should ask them to discuss the functions of each organ.

Step 3: He/She should ask them to make a report on it and present it to their class teacher.

- Thereafter, the teacher should discuss with the learners that the main internal organ of a hen is Alimentary canal as given in the Pupil's book.

(c) Fish

- The teacher should ask the learners to carry out **Activity 9** given in the Pupil's book.

Activity 9: Carrying out Major Characteristics of a Fish

Step 1: The teacher should show the learners the picture of a fish given in the Pupil's book.

Step 2: He should ask the following questions:

  - What does the picture show?
  - Where do fish live?
  - Write some characteristics of a fish.

- After getting answers from the learners, the teacher should discuss that this is a fish.
- He/She should discuss with the learners the characteristic features of a fish as given in the Pupil's book.
- He/She should discuss with the learners that Tilapia is the best example of fish.

External Features of Tilapia

- The teacher should ask the learners to carry out **Activity 10** given in the Pupil's book.

Activity 10: Identifying External Features of Tilapia Fish

Step 1: The teacher should ask the learners to observe the picture and identify the external body parts of a Tilapia fish and label them in their notebook.

Step 2: He/She should discuss with the learners the main external body parts of a Tilapia fish with their functions as given in the Pupil's book.

Internal Features of Tilapia

- The teacher should discuss with the learners that the main internal body parts of a Tilapia are gills. Fishes breathe through their gills.

(d) Reptiles

- The teacher should discuss with the learners the characteristics of reptiles and the internal and external features of snakes as given in the Pupil's book.

Activity 11: Carrying out Major Characteristics of Reptiles

Step 1: The teacher should show the learners the pictures of animals given in the Pupil's book.

Step 2: He should ask the following questions:

- How do these animals move?
- What is their body made up of?
- What are these animals called?

- After the learners present their views, the teacher should tell the learners that these animals are called reptiles and should discuss the characteristic features of reptiles as given in the Pupil's book.

Snake

- The teacher should discuss with the learners that a snake is the best example of a reptile.

External Features of a Snake

- The teacher should ask the learners to carry out **Activity 12** given in the Pupil's book.

Activity 12: Identifying External Features of a Snake

Step 1: The teacher should ask the learners to observe the picture and identify the external body parts of a snake and label them in their science notebook.

Step 2: He/She should discuss with the learners the main external parts of a snake with their functions as given in the Pupil's book.

Internal Features of a Snake

- The teacher should ask the learners to carry out **Activity 13** given in the Pupil's book.

Activity 13: Discussing the Functions of Internal Organs of a Snake

Step 1: The teacher should ask the learners to observe the internal organs of a snake given in the Pupil's book.

Step 2: He/She should ask them to discuss the functions of each body part.

Step 3: He/She should ask them make a report on it and present it to their class teacher.

- Thereafter, the teacher should discuss with the learners the main internal body parts of a snake and their functions as given in the Pupil's book.

(e) Amphibians

- The teacher should discuss with the learners the characteristics of Amphibians and the internal and external features of frogs as given in the Pupil's book.

Activity 14: Carrying out Major Characteristics of Amphibians

Step 1: The teacher should show the learners the pictures of frog, toad and salamander given in the Pupil's book.

Step 2: He should ask the following questions:

- Where do these animals live?
- What is their body made up of?
- What are these animals called?

- The teacher should tell the learners that these animals are called amphibians.
- He/She should discuss with the learners the characteristic features of amphibians as given in the Pupil's book.
- He/She should discuss with the learners that a frog is the best example of an amphibian.

External Features of Frog

- The teacher should ask the learners to carry out **Activity 15** given in the Pupil's book.

Activity 15: Identifying the External Body Parts a Frog

Step 1: The teacher should ask the learners to observe the picture and identify the external body parts of a frog and label them in their science notebook.

Step 2: He/She should discuss with the learners the main external parts of a frog and their functions as given in the Pupil's book.

Internal Features of Frog

- The teacher should discuss with the learners the main internal body parts of a frog—heart, stomach and intestines—and their functions as given in the Pupil's book.

B. Invertebrates

Activity 16: Classifying the Invertebrates According to their Major Characteristics

Step 1: The teacher should guide the learners to carry out the activity as per the procedure given in the Pupil's book.

Step 2: He/She should tell the learners that about 97% of the animals are invertebrates.

- He/She should discuss with the learners the characteristics of invertebrates as given in the Pupil's book.

- He/She should discuss that organisms like *Amoeba* and earthworms and insects like **grasshoppers**, **houseflies** and **butterflies** are **invertebrates**.

Insects

- The teacher should ask the learners to carry out **Activity 17** given in the Pupil's book.

Activity 17: Carrying out the Characteristics of Insects

Step 1: The teacher should show the learners the pictures of locust, butterfly and housefly given in the Pupil's book.

Step 2: He should ask the following questions:
  - How many legs do these animals have?
  - How do they feed?
  - What are these animals called?

- The teacher should tell the learners that these animals are called insects.
- He/She should mention the examples of insects like a locust, housefly, butterfly, bee and a spider.
- He/She should now explain the characteristics of insects as given in the Pupil's book.

Lesson 3: Classification of Animals According to the Respiration Mode

- The teacher should discuss with the learners that different animals have different breathing organs.
- He/She should discuss that we can classify animals into various categories on the basis of their breathing organs.

(a) Animals Breathing through Lungs

Activity 18: Discussion on the Animals Breathing through Lungs

Step 1: The teacher should show the learners the pictures of bird, cat and human given in the Pupil's book.

Step 2: He/She should ask the following questions:
  - How do these animals breathe?

- Can you name some other animals that breathe through lungs?
- The teacher should discuss that these animals breathe through lungs and ask the learners to name other animals that breathe through lungs.

(b) Animals Breathing through Gills

- The teacher should discuss with the learners that aquatic animals such as fish and tadpoles breathe through gills.

(c) Animals Breathing through Skin

- The teacher should discuss with the learners that some animals like earthworms and frogs breathe through their moist skin.

(d) Animals Breathing through Spiracles

Activity 19: Locating the Spiracles in Insects

Step 1: The teacher should ask the learners to take two insects (e.g., cockroach and locust) and two glasses of water.

Step 2: He/She should ask them to dip one insect in water by its abdomen and the other one by its head.

Step 3: He/She should ask them to keep these insects in water for about 5 minutes.

Step 4: He/She should let them remove the insects from water after 5 minutes.

Step 5: He/She should ask:

- Which of these two insects died? Explain why?

- The teacher should discuss that an insect breathes through spiracles. Learners will observe that the insect dipped in water by abdomen died. This shows that the spiracle of the insects are located near the abdomen.

- He/She should further discuss the examples of animals that breathe through spiracles such as caterpillar, grasshopper, housefly and butterfly.

(e) Animals breathing through both Lungs and Skin

Activity 20: Discussion on Animals Breathing through both Lungs and Skin

Step 1: The teacher should show the learners the pictures of a frog, a toad and a turtle given in the Pupil's book.

Step 2: He should ask the following questions:
- How do these animals breathe?
- Can you name some other animals that can breathe through lungs and skin?
- The teacher should discuss that these animals breathe through both lungs and skin. When on land, an adult frog breathes through lungs. But it breathes through its moist skin, when it is under water.

Lesson 4: Classification of Animals According to the Locomotion Mode

Activity 21: Exploring Locomotion Mode of Different Animals

Step 1: The teacher should ask the learners to visit a nearby zoo.

Step 2: He/She should ask them to observe the movement of different animals like birds, lizards, rabbits, elephants and crocodiles.

Step 3: He/She should ask them to make a report on it and present it to the science teacher.
- The teacher should discuss that the movement of animals is called locomotion and on the basis of locomotion, animals are classified into various groups.
- He/She should discuss with the learners the classification of animals according to their locomotion mode such as **flying, crawling, jumping or hopping, walking** and **swimming** as given in the Pupil's book.
- He/She should help learners to carry out **Activities 22** and **23** as per the procedure given in the Pupil's book.

Activity 22: Practising Animal's Walking

Step 1: The teacher should ask the learners to stand up and get more space.

Step 2: Ask them to put one foot forward keeping the other on ground.

Step 3: Ask them to move the second foot forward keeping the first one on ground.

Step 4: Discuss with the learners that this is how most animals move.

Step 5: Ask them to name other animals which move like this.
- Discuss with the learners that animals like goat, dog and human can walk and run. They walk by putting one foot in front of the other on the ground.

Activity 23: Role Playing Locomotion Mode of Animals
- The teacher should help the learners to do this activity as per the instructions given in the Pupil's book.

Lesson 5: Classification of Animals According to the Feeding Mode

- The teacher should ask the learners to carry out **Activity 24** given in the Pupil's book.

Activity 24: Grouping Animals According to the Feeding Mode

Step 1: The teacher should guide the learners to read and carry out the activity themselves.

Step 2: He/She should discuss with the learners the classification of animals according to their feeding mode such as **Herbivores, Insectivores, Carnivores, Omnivores and Granivores** as given in the Pupil's book.

Lesson 6: Classification of Animals According to their Reproductive Mode

- The teacher should discuss with the learners the definition of reproduction.

Activity 25: Grouping Animals According to their Reproductive Mode

Step 1: The teacher should ask the learners to observe the pictures given in the Pupil's book and answer the following questions:
  - Which animals lay eggs?
  - Which animals give birth to their young ones?
  - How do these animals reproduce?

- After the learners present their answers, the teacher should discuss that some animals like tigers, humans and dogs reproduce by giving birth to their young ones. Some other animals like hens, frogs and snakes reproduce by laying eggs.

Lesson 7: Unit Revision

- The teacher should ask questions from the unit review exercises covering all the lessons to assess the competences achieved by the learners.

9.10 ADDITIONAL CONTENT FOR THE TEACHER

Make copies of this worksheet and provide the learners one copy each. Ask them to identify these animals and classify them into vertebrates and invertebrates.

ANIMALS WORKSHEET

Name ....   Date ....

Cat   *Ostrich*   *Snake*   *Turtle*

Crab   *Lizard*   *Star fish*   *Housefly*
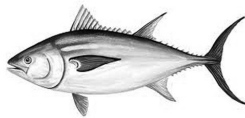
Mosquito   *Tuna fish*   *Frog*   *Hen*

Cow   *Crocodile*   *Earthworm*   *Human*

Vertebrates	Invertebrates

9.11 WEB LINKS FOR CONTENT ENRICHMENT

- http://www.mcwdn.org/Animals/Classification.html
- http://www.sheppardsoftware.com/content/animals/kidscorner/classification/kc_class_again.htm
- http://kids.sandiegozoo.org/animals/mammals

9.12 ANSWERS TO ACTIVITIES

Activity 4

A.	Head	**B.**	Tail	**C.**	Anus	**D.**	Abdomen
E.	Leg	**F.**	Udder				

Activity 7

A.	Beak	**B.**	Head	**C.**	Feathers	**D.**	Leg
E.	Scales						

Activity 10

A.	Nostrils	**B.**	Dorsal fin	**C.**	Scales	**D.**	Caudal fin
E.	Pelvic fin	**F.**	Pectoral fin				

Activity 15

A.	Head	**B.**	Thorax	**C.**	Abdomen	**D.**	Legs

9.13 SOLUTIONS TO UNIT REVIEW EXERCISES

I. Fill in the blanks with the correct options:

1. (a)   2. (b)   3. (b)
4. (c)   5. (b)   6. (b)

II. State whether the following statements are true or false:

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

III. Match the following:

1. (b)   2. (a)   3. (d)
4. (e)   5. (c)

IV. Answer the following questions briefly:

1. The animals having backbone are called vertebrates.
2. Five major classes of vertebrates are—mammals, birds, reptiles, amphibians and fish.

3. Lizard and snake
4. Gills
5. Earthworms and frogs
6. Tadpoles and fish
7. Grasshopper and housefly
8. Frog and salamander
9. Animals lacking backbone are called invertebrates.
10. Some properties of invertebrates are:
    (a) They don't have backbones
    (b) They cannot make their own food.
11. Insects have six legs, and they breathe through their spiracles.
12. Rodents

V. **Complete the crossword puzzle using the clues below:**

Across	**Down**
3. Herbivores	1. Vertebrates
5. Carnivores	2. Granivores
	4. Mammal

9.14 ASSESSMENT METHOD

Use observation technique, question answer technique, and demonstration technique to assess the learners' achievement in learning objectives.

9.15 ASSESSMENT

1. .... have a backbone. (Vertebrates/Invertebrates)
2. .... have hairs on their body. (Mammals/Amphibians)
3. Name the tube running from the mouth to anus.
4. Which of these animals is a granivore?
   (a) Vulture   (b) Rat   (c) Crow
5. Which of these animals is an invertebrate?
   (a) Frog   (b) Housefly   (c) Bird

Answers

1. Vertebrates   2. Mammals   3. Alimentary canal
4. Rat   5. Housefly

UNIT 10—ANIMALS MANAGEMENT

10.1 LEARNING OBJECTIVES

At the end of this unit, the learners should be able to:

Knowledge and Understanding	Skills	Attitudes and Values
• Identify the conditions of a good rabbit hutch. • Explain the criteria for choosing a rabbit to rear. • Explain the proper feeding of rabbits. • Identify the most common diseases of rabbits and their prevention. • Point out the importance of practising rabbit farming.	• Distinguish male from female rabbit. • Do right choice of rabbits to rear. • Design a small scale rabbit keeping project. • Apply basic techniques of cuniculture (rabbit farming).	• Show interest in practising cuniculture. • Develop awareness of the socio-economical and welfare value of practising cuniculture. • Develop curiosity towards knowing more about rabbits' lives and that of other domestic animals.

10.2 CONTENTS

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                         ┌─────────────────────┐
                         │ Animals Management  │
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Conditions of a good rabbit hutch	Charac-teristics of good rabbits	Proper feeding of rabbits	Rabbit health	Common diseases	Importance of rabbit farming
• should be airy dry and clean • should have enough material to play	• Breeds • Colour and coat • Age • Health • Environ-ment	• Vegetables • Carrot	• Clean the hutches • Feed the rabbit	• Cocci-diosis • Ear scabies • Tape-worm	• For meat • Business

10.3 INTRODUCTION

- This unit introduces the learners to the conditions of a good rabbit hutch.
- This unit also teaches how to differentiate between a doe and a buck, how to choose good rabbits to rear, how to feed rabbits, what the common diseases are among rabbits and why we should farm rabbits.

10.4 TEACHING AIDS

- **Audio-video:**   Video showing male and female rabbits.

    Video showing common diseases of rabbits and prevention.
- **Vocabulary:**   Names of diseases.

10.5 TEACHER'S TIP

You could start the lesson with the explanation of need to manage animals. Explain the learners about cuniculture—a practice of breeding and raising domestic rabbits, usually for their meat, fur or wool. Make the learners visit a rabbit farm to experience cuniculture. As a guide introduce them to the practices of cuniculture including conditions of rabbit hutch and feeding and hygiene for rabbit. Let the learners observe and play with domestic rabbits. Ask them to know more about rabbits and their diseases from the farm people. The interaction would help the learners to investigate their queries and develop thinking of cuniculture.

10.6 TEACHING METHODS

- Brainstorming, short lecture technique, group discussion, field visit, observation technique, think pair shares technique and demonstration technique.

10.7 TEACHING AND LEARNING MATERIALS

- Hay, good high fibre pellet, fresh vegetables and clean water
- Library books or search engines
- Rabbits and rabbit hutch

10.8 LESSON PARTITION

No.	Lesson Title	Contents	Learner's Activities	Number of Periods
1.	Conditions of a Good Rabbit Hutch	• Identification of conditions of a good rabbit hutch	• Field visits of different rabbit farms, make observations and group discussions aiming to outline the conditions of a good rabbit hutch.	1
2.	Characteristics of Good Rabbits	• Characteristics of good female rabbit (doe) • Characteristics of good male rabbit (buck)	• Visiting a nearby rabbit farm. Observing rabbits of opposite sexes. Comparing their characteristics and making a report on it.	1
3.	Distinguishing Male from Female Rabbits	• Distinguishing male from female rabbits	• Visiting a rabbit farm. Comparing characteristics of both male and female rabbits to distinguish them.	1
4.	Criteria for Choosing a Rabbit to Rear	• Rabbit breeding guide • Doing right choice of rabbits to rear	Group discussion regarding characteristics of good male and good female rabbit to cross.	2

(*Contd...*)

5.	Proper Feeding of Rabbits	• Explanation of proper feeding of rabbits	• Group discussion on the practice of good feeding and hygiene for rabbits. • Collecting hay, good high fibre pellet, fresh vegetables and clean water to feed rabbits.	2
6.	Rabbit Health	• Discussing some sanitary measures to be taken to keep the rabbit healthy.	• Visiting a rabbit farm. Exploring the measure the farm worker adopts to keep the rabbit healthy	1
7.	Common Diseases in Rabbits	• Identification of the most common diseases of rabbits and their prevention	• Research using library books/search engines or by visiting local rabbit farm, then group discussion on common diseases of rabbits.	1
8.	Importance of Rabbit Farming	• Point-out the importance of practising rabbit farming	• Making group discussion on the importance of rabbit farming. • At school (especially rural schools), learners implement a small scale cuniculture project. They will feed them, clean the hutch and diagnose for possible diseases.	2
9.	Unit Revision	• Conditions of a good rabbit hutch • Characteristics of good rabbits • Criteria for choosing a rabbit to rear • Proper feeding of rabbits • Common diseases of rabbits • Importance of rabbit farming	• Answering the unit review exercises.	1

10.9 TEACHING METHODOLOGY AND LEARNER'S ACTIVITIES

Lesson 1: Conditions of a Good Rabbit Hutch

- This lesson should be taught by actual rabbit observation. If it is not possible to keep rabbits or bring a rabbit hutch in the school, the teacher should arrange to take the learners to a nearby rabbit farm. There the learners can observe and ask questions to the rabbit farmers about conditions required for a good rabbit hutch.

Activity 1: Exploring the Conditions of a Good Rabbit Hutch

Step 1: The teacher should arrange a field visit of the learners to a nearby rabbit farm and guide them to observe and note the different conditions necessary for a good rabbit hutch.

Step 2: He/She should ask them to make a report on it and discuss in the class.

Step 3: Then the teacher should lead a group discussion among the learners.

- The teacher may ask the following questions:
  (a) What did they observe in the rabbit farm?
  (b) What are the conditions required which the rabbit owner suggested for a good rabbit hutch?

- Through this question answer session, the learners will be able to learn the conditions of a good rabbit hutch.

- After discussing with the learners, the teacher can give an activity to make a model of a rabbit hutch.

Activity 2: Building a Model Rabbit Hutch

Step 1: The teacher should ask the learners to bring paper cartons, sticks and dry grass to build a model rabbit hutch.

Step 2: He/She should ask the learners to place things that they think will be good for the rabbits.

Lesson 2: Characteristics of Good Rabbits

- The teacher should ask the learners to carry out **Activity 3** given in the Pupil's book.

Activity 3: Exploring the Characteristics of Good Rabbits

Step 1: The teacher should arrange a trip for the learners to a local rabbit farm.

Step 2: He/She should ask the learners to observe the different characteristics of a good male and female rabbit.

Step 3: He/She should ask the learners to compare their characteristics and make a report on it.

- After the activity, the teacher should discuss with the learners the special characteristics of a good female and male rabbit as given in the Pupil's book.

Lesson 3: Distinguishing Male from Female Rabbits

- Through a field trip, the teacher can make the learners understand how to distinguish between a male rabbit and a female rabbit.

Activity 4: Distinguishing a Male Rabbit from a Female Rabbit

Step 1: The teacher should arrange a trip for the learners to a local rabbit farm.

Step 2: He/She should ask the learners to observe the rabbits of opposite sexes.

Step 3: He/She should ask the learners to compare their characteristics and make a report on it.

- Thereafter, the teacher should discuss the ways in which a male rabbit is different from a female rabbit as given in the Pupil's book.

Lesson 4: Criteria for Choosing a Rabbit to Rear (Rabbit Breeding Guide)

- The teacher should guide the learners to carry out **Activity 5** given in the Pupil's book.

Activity 5: Discussing the Criteria for Choosing a Rabbit to Rear

Step 1: The teacher should ask the learners to visit a local rabbit farm.

Step 2: He/She should ask the learners to discuss with the farm owner about criteria for choosing a rabbit to rear.

Step 3: He/She should ask them to make a report on it and present it to the class.

- Thereafter, the teacher should discuss with the learners the different criteria to choose a rabbit to rear such as **breeds, colour and coat, age, health** and **environment.**

Lesson 5: Proper Feeding of Rabbits

- The teacher should teach this lesson by guiding the learners to carry out **Activity 6** given in the Pupil's book themselves.

Activity 6: Proper Feeding of Rabbits

Step 1: The teacher should take the class to a nearby rabbit farm.

Step 2: He/She should ask the learners to observe the feeding and watering troughs.

Step 3: If they observe any trough which needs cleaning, they will ask the farm owner to clean the trough.

- Thereafter, the teacher should discuss with learners that rabbits feed on green leafy vegetables, carrots, beetroots, turnips and pellets. Pellets are manufactured animal feed. Rabbits should also have a supply of water at all times which should be changed twice a day.

Lesson 6: Rabbit Health

- The teacher should guide the learners to carry out **Activity 7** given in the Pupil's book.

Activity 7: Exploring the Measures that the Farm Worker Adopts to Keep the Rabbit Healthy

Step 1: The teacher should arrange to take the class to a local rabbit farm.

Step 2: He/She should ask the learners to observe various measures that the farm workers adopt to keep the rabbits healthy.

Step 3: He/She should ask the learners to make a report on it and present it to the class.

- After the activity, the teacher should discuss with the learners the important sanitary measures that should be adopted to prevent health problems in rabbits as given in the Pupil's book.

Lesson 7: Common Diseases in Rabbits

- The teacher should guide the learners to carry out **Activity 8** given in the Pupil's book

Activity 8: Discussing the Common Rabbit Diseases

Step 1: The teacher should arrange to take the class to a local rabbit farm.

Step 2: He/She should ask the learners to discuss with the farm owner about common rabbit diseases, their symptoms and prevention.

Step 3: He/She should ask the learners to make a report on it and present it to the class.

- Thereafter, the teacher should discuss with the learners the common diseases of rabbits such as **Coccidiosis, Ear Scabies, Tapeworms** and **Pneumonia** along with their prevention and treatment techniques as given in the Pupil's book.

Lesson 8: Importance of Rabbit Farming

- The teacher should ask the learners to carry out **Activity 9** given in the Pupil's book.

Activity 9: Discussing the Importance of Rabbit Farming

Step 1: The teacher should ask the learners to discuss the importance of rabbit farming.

Step 2: He/She should ask them to make a report on it and present it to their science teacher.

- Thereafter, the teacher should discuss with the learners the different purposes for which the rabbit is sold in the market as given in the Pupil's book.

Lesson 9: Unit Revision

- The teacher should ask questions from the unit review exercises covering all lessons to assess the competences achieved by the learners.

10.10 ADDITIONAL CONTENT FOR THE TEACHER

Make copies of this worksheet and provide the learners one copy each. Ask them to colour it and label its body parts.

ANIMALS MANAGEMENT WORKSHEET

Name: .... Date: ....

1. Colour the rabbit and label its body parts.

10.11 WEB LINKS FOR CONTENT ENRICHMENT

- http://www.wikihow.com/Build-a-Rabbit-Hutch
- http://athomepets.weebly.com/the-rabbit-and-its-uses.html
- http://www.instructables.com/id/Building-a-small-rabbit-hutch/
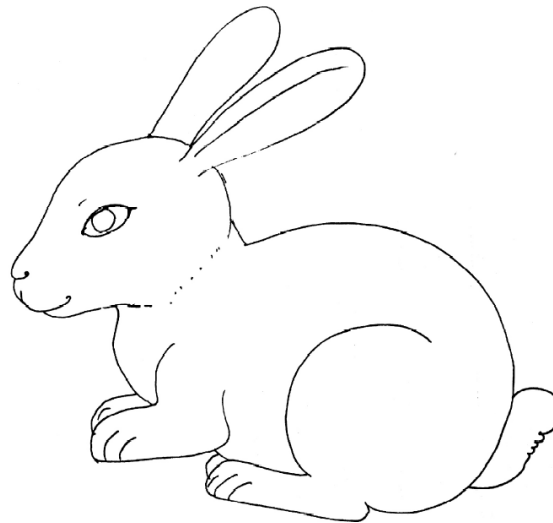
10.12 SOLUTIONS TO UNIT REVIEW EXERCISES

I. **Fill in the blanks with the correct options:**

   1. (b)   **2.** (b)   **3.** (b)

II. **State whether the following statements are true or false:**

   1. False   **2.** True   **3.** False

   4. True   **5.** False

III. **Match the following:**

   1. (d)   **2.** (c)   **3.** (b)   **4.** (a)

IV. **Answer the following questions briefly:**

   1. Two conditions of a good rabbit hutch are:

      (a) Hutches should be airy, dry and clean.

      (b) Rabbits should have enough material to play with, such as small toys, pipes and ramps.

   2. (a) The size of a female rabbit is larger than that of a male rabbit of the same age in the same breed.

      (b) The round face in females is comparative to the block-like face in males.

      (c) Old females have dewlaps but males haven't.

      (d) Males are more defensive than females.

      (e) Males produce more urine than females during the mating period.

   3. We can select a rabbit to rear by checking its age and breed.

   4. A rabbit feeds on green leafy vegetables, carrots, beetroots turnip and pellets. Pellets are manufactured animal feed. They provide complete nutrition to the rabbit.

   5. To keep a rabbit healthy:

      (a) Clean the hutches or cages once in a week.

      (b) Clean the feeding and watering troughs daily to avoid contamination.

   6. Four common diseases of rabbits are Coccidiosis, Ear scabies, Tapeworm and Pneumonia.

7. **Symptoms of ear scabies**

    (a) Brown scab inside the ear canal.

    (b) Swelling and painful ear.

    Prevention of ear scabies

    (a) Isolate the affected rabbit.

    (b) Keep the hutch clean.

8. Rabbit farming is important for two reasons:

    (a) The meat of rabbits is sold for food.

    (b) The fur of rabbits is made into wool and then woven into cloth.

9. We can use the skin of rabbit for making bags and gloves.

V. **Complete the crossword puzzle using the clues below:**

Across		**Down**	
3.	Buck	**1.**	Hutch
4.	Exotic	**2.**	Doe

10.13 ASSESSMENT METHODS

Use observation technique, question answer technique, and demonstration technique to assess the learners' achievement of learning objectives

10.14 ASSESSMENT

1. Pet rabbits live in ………….. (burrows/hutches)
2. A female rabbit is commonly known as a …………... (doe/buck)
3. What does a rabbit feed on?
4. Name one common disease of rabbits.
5. Male rabbits are more defensive than females. (True/False)

Answers

1. hutches
2. doe
3. A rabbit feeds on green leafy vegetables, carrots, beetroots, turnips and pellets.
4. Coccidiosis
5. True

11.1 LEARNING OBJECTIVES

At the end of this unit, the learners should be able to:

Knowledge and Understanding	Skills	Attitudes and Values
• Explain the process of germination. • Identify types of germination. • Explain stages of germination. • Label different parts of the plant. • Explain the functions of each part of the plant.	• Select good seeds. • Design a setting enabling the germination of some samples of seeds. • Draw and label a sample of a plant. • Plant some samples of seeds in the school garden and ensure the follow up.	• Show curiosity in exploring the germination of a variety of seeds. • Show the awareness of the importance of plants to the environment and human beings. • Develop positive attitudes towards conservation of plants as part of living things.

11.2 CONTENTS

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                          ┌─────────┐
              ┌───────────│ Plants  │───────────┐
              │           └─────────┘           │
              │                 │               │
    ┌──────────────────┐ ┌──────────────┐ ┌──────────────────┐
    │ Types of germination │ │ Types of plants │ │ Parts of a plant │
    └──────────────────┘ └──────────────┘ └──────────────────┘
              │                 │               │
    ┌──────────────────┐ ┌──────────────┐ ┌──────────────────┐
    │ • Epigeal germination │ │ • Trees      │ │ • Root           │
    │ • Hypogeal germination│ │ • Shrubs     │ │ • Stem           │
    │                  │ │ • Herbs      │ │ • Leaf           │
    │                  │ │              │ │ • Flower         │
    │                  │ │              │ │ • Fruit          │
    └──────────────────┘ └──────────────┘ └──────────────────┘
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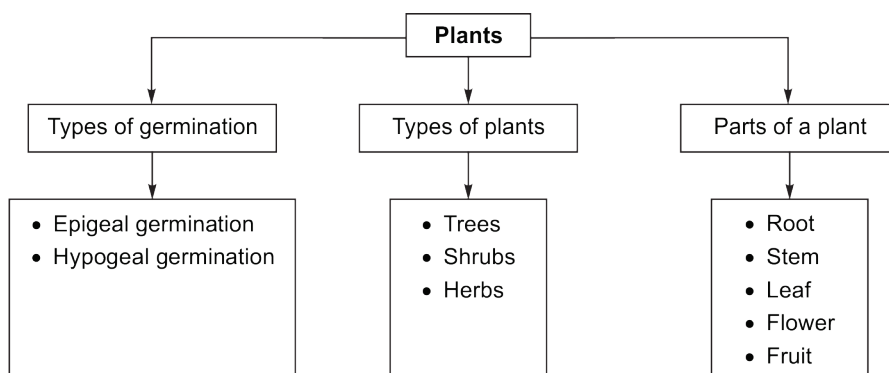
11.3 INTRODUCTION

- This unit introduces the learners to seeds, how a plant germinates from seeds, what conditions are necessary for germination of seeds and types of germination such as epigeal germination and hypogeal germination.

- This unit also introduces the learners to different types of plants such as trees, shrubs and herbs. Different parts of a plant and their functions have also been discussed in this unit.

11.4 TEACHING AIDS

- **Visual:** Healthy seeds and unhealthy seeds; images of different plants.
- **Audio-video:** Clips showing germination process and its stages.

11.5 TEACHER'S TIP

You could start the topic by making learners observe a green plant. Let them touch and see it. Ask them to label its parts. Explain them the story of seed germination—the formation of a tiny plant and its growth. Try to compare the story of a child with a plant. Ask the learners to learn more about plants and their uses. Ask them to observe the variety of plants. Comment on the necessity of plants. Make the learners aware of the uses and role of plants in environment. Create an understanding of plant conservation. Ask the learners to discuss the methods of conservation. This would create a positive attitude in the minds of the learners to save the lesson.

11.6 TEACHING METHODS

- Brainstorming, short lecture technique, group discussion technique, observation technique, think pair share technique, drawing technique, demonstration technique, field visit, site visit and practical work.

11.7 TEACHING AND LEARNING MATERIALS

- Containers, cotton, wool, cowpea seeds and a refrigerator
- Plastic jar, soil and water
- Seeds of maize and beans and transparent plastic pots.

11.8 LESSON PARTITION

No.	Lesson Title	Contents	Learner's Activities	Number of Periods
1.	Definition of Germination	• Definition of germination	• **Observation:** Take the learners out of the classroom and guide them in observing a variety of plants and record information	1
2.	Conditions Necessary for Seed Germination	• Demonstration of conditions of germination	• Group discussion and report on the conditions of germination • Demonstrating the conditions necessary for germination.	1
3.	Types of Germination	• Identification of the types of germination	• **Project:** In the classroom corner, carry out an investigation on the germination of beans and maize seeds:	2
4.	Stages of Germination	• Explanation of stages of germination	• Demonstrating the stages of germination	4
5.	Types of Plants	• Labelling types of plants	• Observing various plants around them. Collecting information on them. Sorting them into trees, herbs and shrubs.	2
6.	Parts of a Plant and their Functions	• Labelling different parts of plant • Explanation of the functions of each part of plant, i.e., root, stem, leaf, flower and fruit	• Visit the school surrounding to observe, name different parts of plant and discuss their functions • Plant a variety of seeds and maintain new plants in the school garden to protect its environment.	2

(*Contd...*)

7.	Unit Revision	• Definition of germination • Conditions necessary for seed germination • Types of germination • Stages of germination • Types of plants • Parts of plants and their functions	• Answering unit review exercises	2

11.9 TEACHING METHODOLOGY AND LEARNER'S ACTIVITIES

- The teacher should begin the unit by discussing with the learners that plants are living things. They grow from seeds. Most plants bear seeds. Seeds germinate and grow into new plants.

Lesson 1: Definition of Germination

- The teacher should discuss with the learners that growing of seeds into seedlings is called **germination**.
- He/She should guide the learners to carry out **Activity 1** given in the Pupil's book.

Activity 1: Germination of Seeds

Step 1: The teacher should ask the learners to take some gram seeds and sow them in the school garden.

Step 2: He/She should ask them to sprinkle water to keep the soil moist.

Step 3: He/She should ask them to observe these daily for 3–4 days.
- The teacher should discuss that when seeds get enough air, water and light, they grow into new plants or seedlings.

Lesson 2: Conditions Necessary for Seed Germination

- The teacher should discuss with the learners that every seed needs certain favourable conditions to germinate.
- He/She should guide the learners to carry out **Activity 2** given in the Pupil's book to demonstrate the conditions necessary for seed germination.

Activity 2: Experiment on Conditions Necessary for Germination

Step 1: The teacher should ask the learners to collect four containers, cotton wool, some viable and non-viable cowpea seeds.

Step 2: He/She should let them mark the four containers A, B, C and D as follows:

A with a dry cotton wool.

B, C and D with a moist cotton wool each.

Step 3: He/She should ask them to place 3–4 viable (healthy) cowpea seeds at the top of the cotton wool in containers A, B and D and non-viable (unhealthy) seeds in container C.

Step 4: He/She should let them place containers A, B and C in sufficient light and air.

Step 5: He/She should ask them to place container D in the cupboard.

Step 6: He/She should let them observe these containers daily for 3–4 days.

Step 7: He/She should ask them to discuss their findings in the class.

- After carrying out the activity, the learners conclude that **oxygen**, **water** and **suitable temperature** are the necessary conditions for **viable seeds** to germinate.

Lesson 3: Types of Germination

- The teacher should ask the learners to carry out **Activity 3** given in the Pupil's book.

Activity 3: Identifying the Types of Germinations

Step 1: The teacher should ask the learners to observe the two pictures given in the Pupil's book.

Step 2: He/She should ask the learners to tell what these pictures represent and what difference they observe in both pictures.

- The teacher should discuss that both pictures represent germination of seeds but of different types.
- Thereafter, he/she should discuss with the learners the two types of germination (**epigeal** and **hypogeal**) with examples.

Lesson 4: Stages of Germination

- The teacher should discuss with the learners the different stages of germination through **Activity 4** given in the Pupil's book.

Activity 4: Identifying Main Stages of Germination

Step 1: The teacher should ask the learners to take a small plastic jar and fill it with soil.

Step 2: He/She should ask them to take a viable bean or a maize seed and place it in the soil of the jar.

Step 3: He/She should let them keep the jar in a bright airy place.

Step 4: He/She should ask them to sprinkle water every day and observe.

Note: *Make sure that soil is always damp. The seed needs water to grow.*

Step 5: He/She should ask them to record their observations in their notebooks.

- Thereafter, the teacher should discuss with the learners the four stages in the process of germination as given in the Pupil's book.

Lesson 5: Types of Plants

- The teacher should ask the learners to carry out **Activity 5** given in the Pupil's book.

Activity 5: Sorting Plants into Trees, Herbs and Shrubs

Step 1: The teacher should ask the learners to go on a nature walk.

Step 2: He/She should ask them to observe various plants.

Step 3: He/She should ask them to collect information on different plants.

Step 4: He/She should ask them to sort these plants into trees, herbs and shrubs.

- After completion of the activity, the teacher should discuss with the learners the characteristics of **trees**, **shrubs** and **herbs** along with their examples.

Lesson 6: Parts of a Plant and their Functions

- The teacher should guide the learners to carry out **Activity 6** in the Pupil's book.

Activity 6: Identifying Different Parts of Flowering Plant and Discussing Function for Each Part

Step 1: The teacher should arrange a field visit of the learners to the areas surrounding the school.

Step 2: He/She should ask the learners to uproot a small flowering plant and observe its various parts.

Step 3: He/She should ask them to name these parts and discuss their functions in the class.

- The teacher should discuss with the learners that a plant has many parts such as roots, stems, leaves, flowers and fruits.

- He/She should also discuss the different functions of each part of a plant.

Project: Maintaining Plants to Protect Our Environment

Step 1: The teacher should ask the learners to plant a variety of seeds in their school garden.

Step 2: He/She should ask them to maintain the new plants to protect their environment.

Lesson 7: Unit Revision

The teacher should ask the learners all questions from the unit review exercises covering all lessons to assess the competences achieved by the learners.

11.10 ADDITIONAL CONTENT FOR THE TEACHER

Make copies of this worksheet and provide the learners one copy each to test their knowledge and understanding.

PLANT WORKSHEET

Name: .... Date: ....

1. Observe this picture. Identify all its parts and label them.

11.11 WEB LINKS FOR CONTENT ENRICHMENT

- http://plantsinmotion.bio.indiana.edu/plantmotion/
- http://study.com/academy/lesson/what-is-seed-germination
- http://theseedsite.co.uk/germinating.html
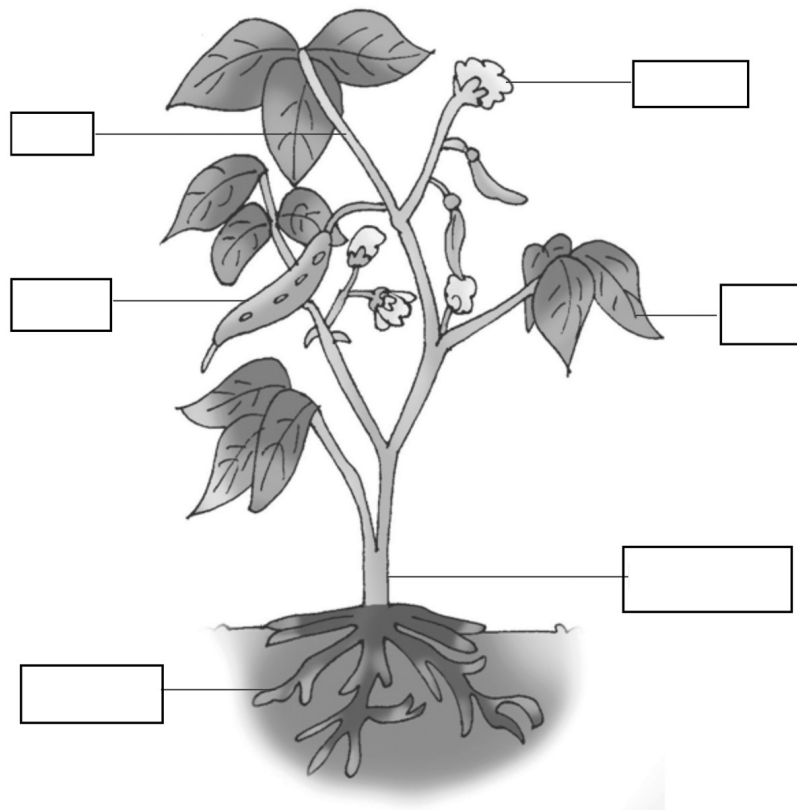
11.12 SOLUTIONS TO UNIT REVIEW EXERCISES

I. **Fill in the blanks with the correct options:**

   1. (a)   **2.** (c)   **3.** (c)   **4.** (d)
   5. (c)

II. **Match the following:**

   1.(a)   **2. (b)**   **3. (c)**

III. **State whether the following statements are true or false:**

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

IV. **Answer the following questions briefly:**

   1. When seeds get enough air, water and sunlight, they grow into seedlings. The growing of seeds into seedlings is called germination.
   2. Two types of germination are—epigeal germination and hypogeal germination.
   3. The hard, strong, and thick stems of a tree is called trunk.
   4. Hibiscus and rose
   5. *Functions of roots*:
   – Roots fix the plant into the soil.
   – They absorb water and minerals from the soil. Water and minerals are important for plants to grow healthy.
   6. Cauliflower and broccoli
   7. *Functions of flowers*:
   – Flowers turn into fruits.
   – They give off a sweet smell. So they are used to decorate houses and gardens.
   Functions of fruits:
   – Fruits protect the seeds.
   – Fruits are a part of our diet.

V. Complete the crossword puzzle using the clues below:

Across	Down
2. Stem	**1.** Shrub
3. Tree	**2.** Seed
4. Herb	

11.13 ASSESSMENT METHODS

Use observation technique, question answer technique, and demonstration technique to assess the learners' achievement of learning objectives.

11.14 ASSESSMENT

1. Name two types of germination.
2. Name a seed in which epigeal germination occurs.
3. Tall plants are trees. (True/False)
4. Give one example of a shrub.
5. Which part of the plant grows below the ground?

Answers

1. Epigeal germination and hypogeal germination
2. Bean
3. True
4. Hibiscus
5. Root

UNIT 12—HUMAN SENSORY ORGANS

12.1 LEARNING OBJECTIVES

At the end of this unit, the learners should be able to:

Knowledge and Understanding	Skills	Attitudes and Values
• Explain the functional mechanism of the sensory organs. • Identify the parts of skin. • Explain the functions of skin. • Explain the properties of skin. • Explain how to take care of skin. • Recognize some skin diseases. • Explain how to deal with skin accident. • Identify the different zones of tongue. • State the different functions of tongue. • Explain the hygiene and care of tongue. • Outline the tongue disorders and its possible accidents. • List the different parts of nose.	• Draw and label the structure of skin. • Apply principles of hygiene of skin. • Intervene efficiently in case of skin accident. • Draw and label tongue. • Apply the techniques of cleaning tongue. • Draw and label the different parts of nose. • Develop smelling skills. • Apply accurately various techniques of maintaining hygiene of nose. • Intervene adequately in case of nose accident. • Draw and label the different parts of ears. • Apply accurately various techniques of maintaining hygiene of ears.	• Show concern about the mechanism of action of all sensory organs. • Show concern about the hygiene and care of one's own skin. • Develop a habit of regularly consulting physicians both for prevention and treatment of skin diseases. • Develop a habit of keeping the tongue cleaned. • Develop an awareness of prevention against possible tongue accidents. • Develop a habit of consulting a physician both for prevention and treatment of possible tongue diseases. • Appreciate and value the importance of nose in human life. • Develop an awareness of prevention against possible nose accidents.

Knowledge and Understanding	Skills	Attitudes and Values
• Explain the function of nose. • Explain how to maintain hygiene of nose. • Identify the most common nose diseases and their possible causes. • Explain the nose diseases, accidents and their prevention. • Identify and describe the main parts of ears. • State the function of ears. • Explain the hygiene of ears. • Identify the diseases of ears and their possible causes. • Describe the structure of human eyes. • Explain the anatomy of human eyes. • List the eye defects. • Explain how to correct eye defects. • Explain the prevention of eye defects.	• Draw and label the structure of human eyes. • Recognize different eye defects and explain how to correct them. • Apply techniques of prevention from the most common eye defects.	• Develop the habit of consulting a physician both for prevention and treatment of possible nose diseases. • Appreciate and value the importance of ears in human life. • Develop the habit of regularly cleaning one's ears. • Develop the habit of consulting a physician both for prevention and treatment of possible ear disorders. • Show awareness of the importance of eye and its role in the human life. • Be sensitive to anything that may affect the eye health. • Display the habit and reflex of protecting one's eyes against all potential dangers that may affect the eyes. • Develop the habit of consulting a physician both for prevention and treatment of possible eye defects.

12.2 CONTENTS

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                    ┌─────────────────┐
                    │ Human Sensory   │
                    │     Organs      │
                    └─────────────────┘
```

The skin	The tongue	The nose	The ear	The eye

• Parts of skin
• Function of skin
• Hygiene of skin
• Skin diseases
• Skin accidents and first aid
	• Different zones of the tongue
	• Function of tongue
	• Care of tongue
	• Tongue disorders
	• Tongue accidents
		• Parts of nose
		• Function of nose
		• Hygiene of nose
		• Diseases of nose
		• Prevention of nose diseases
		• Nose accidents
			• Parts of ear
			  ▪ Outer ear
			  ▪ Middle ear
			  ▪ Inner ear
			• Function of ear
			• Hygiene of ear
			• Diseases of ear
			• Causes of ear diseases
				• Parts of eyes
				• Three layers of eyes
				• Three chambers of eyes
				• Eye function
				• Eye defects
				• Prevention of eye defects

12.3 INTRODUCTION

This unit introduces the learners to

- organs which help us to see, hear, smell, taste and feel, their functional mechanism, structure, function and maintenance.
- skin, its functions, properties and diseases.
- tongue, its functions, properties, tongue disorders and proper cleaning of tongue.
- nose, its functions and disease.
- ear, its functions and diseases.
- eyes, their functions, parts of eyes, and disorders of eyes.

12.4 TEACHING AIDS

- **Audio-video:** (i) Clips showing human sensory organs and their functions.
  - (ii) Video showing parts of sensory organs.
  - (iii) Video showing the hygiene of each sensory organ.
- **Visuals:** (i) Images of common diseases of eye, nose, skin, tongue and ear.
  - (ii) Structure of eye, nose, tongue, skin and ear.

12.5 TEACHER'S TIP

You could start the lesson by introducing human sensory organs to the learners. There are five Human Sensory Organs—the Skin, the Tongue, the Nose, the Ear, and the Eye. Explain them the basic functions operating in them using a chart. Make them aware of the necessity of these organs in life and how hard life could be for those without any of them. Explain the importance of caring of these organs. Tell them about diseases of these organs and their causes. Also tell them how important is to consult a physician both for prevention and treatment of diseases. Each sense organ imparts its own uses, own difficulties, own disorders and own meaning in life. Appreciate the importance of having sense organs. Develop in them the feeling of positivity and self care.

12.6 TEACHING METHODS

- Group research, observation, group discussion, role play and practical work.

12.7 TEACHING AND LEARNING MATERIALS

- Hand lens
- Different food samples
- Perfume, cotton and wool
- Lens, wall charts and objects to produce sound or to taste.

12.8 LESSON PARTITION

No.	Lesson Title	Contents	Learner's Activities	Number of Periods
1.	Functional Mechanism of All Sensory Organs	• Definition of sensory organs • Explanation of the functional mechanism of all sensory organs	• Group research on the functional mechanism of all sensory organs from library or search engines.	2

(Contd…)

| 2. | Structure, Function and Maintenance of Skin | • Identification of parts of the skin
• Explanation of functions of the skin
• Explanation of main properties of the skin
• Explanation on how to take care of skin (Hygiene of the skin)
• Recognition of some skin diseases
• Explanation on dealing with skin accidents
• Skin accidents first aid | • **Observation:** In small groups using a lens, observe different types of skin (in the palm of the hand, the skin on arms or on the head).
• On wall charts, observe the inner parts of the skin.
• Group discussion on the functions and properties of skin.
• Discuss in groups and implement the rules of skin hygiene.
• Group discussion on common skin diseases.
• Role play by two learners simulating the first aid intervention in case of skin accident. One learner will act as a victim. The other learner will provide him/her necessary first aid. | 4 |
| 3. | Structure, Function and Maintenance of Tongue | • Identification of different zones of the tongue
• Stating different functions of the tongue
• Explanation of hygiene and care of the tongue
• Outlining the tongue disorders and its possible accidents | • **Observation:** Learners observe on the wall chart and name different zones of the tongue, then draw in their exercises book.
• **Practical work:** Taste different food samples to locate the different parts of the tongue.
• **Group discussion:** In small group discuss the functions of the tongue. | 4 |

(*Contd…*)

			• **Practical:** Each individual learner will use a brush to clean the tongue. • Group discussion on common tongue disorders and accidents.	
4.	Structure, Function and Maintenance of Nose	• Identification of the parts of the nose • Explanation of function of the nose • Explanation of hygiene of the nose • Identification of the most common nose diseases and their possible causes • Explanation of the nose diseases, accidents and their prevention	• **Observation:** Learners observe on the wall chart and name different parts of the nose then draw in their exercise book. • **Practical work:** Smell different samples of various substances to identify the substance by its smell. • Group discussion on common nose disorders and accidents. • **Discussion:** In small groups discuss about the most common nose diseases and their causes. • **Practical:** Each individual learner will clean the nose by removing mucus in excess or other particles in the nostril and nasal cavity. • Role play simulating the first aid intervention in case of nose accident.	4

| 5. | Structure, Function and Maintenance of Ear | • Identification and description of the main parts of the ear
• Specific function of the ear
• Explanation of hygiene of the ear
• Identification of the diseases of the ear and their possible causes | • **Observation:** Learners observe on the wall chart and name different parts of the ear, then draw in their exercise book.
• **Discussion:** In small groups discuss about the hygiene of the ears.
• **Practical work:** Collect suitable materials (warm water, wet washing cloth). Then each individual learner will clean the ears.
• **Discussion:** In small groups discuss about the most common ear diseases and their causes. | 4 |
| 6. | Structure, Function and Maintenance of Eye | • Description of the structure of human eye
• Drawing and labelling the structure of human eye
• Explanation of the anatomy of human eye
• Listing eye defects
• Explanation on how to correct eye defects
• Explanation on prevention of eye defects | • **Observation:** Under the teacher's guidance, learners observe on the wall chart and name different parts of the eye then draw the same in their exercises book.
• **Discussion:** In small groups use the picture (diagram/drawing) and refer to their own eyes to discuss the functioning of the eye, then share with the whole class.
• **Investigation:** In small groups, learners investigate the conditions which ease or harden the sight (seeing things). | 5 |

(*Contd…*)

			• **Demonstration:** Learners to visualise things through different types of lens to understand how lens can be used as ways of correcting eye defects.	
			• **Research:** As a kind of homework, learners search for information from various sources (parents, peers, nearest health facilities, printed materials, electronic sources) about the prevention of eye defects and later share information with peers in the classroom.	

7.	Unit Revision	• Functional mechanism of all sensory organs
		• Structure, function and maintenance of sensory organs:
		  o The Skin
		  o The Tongue
		  o The Nose
		  o The Ear
		  o The Eye
			• Answering unit review exercise	2

12.9 TEACHING METHODOLOGY AND LEARNER'S ACTIVITIES

- The teacher should discuss with the learners that organs which help us to see, hear, smell, taste and feel are called **sensory organs**. The organs which help us to know the world around us are eyes, ears, nose, tongue and skin. These are our sensory organs.

Lesson 1: Functional Mechanism of all Sensory Organs

- The teacher should introduce the lesson by guiding the learners to carry out **Activity 1** given in the Pupil's book.

Activity 1: Research on Functional Mechanism of Sensory Organs

Step 1: The teacher should ask the learners to research on the functional mechanism of all sensory organs from library or search engines like Google or Yahoo.

Step 2: He/She should ask them to make a report on it and present it to the class.

- The teacher will further discuss with the learners the working of the sensory organs as given in the Pupil's book.

Lesson 2: Structure, Function and Maintenance of Skin

- The teacher should discuss with the learners that the skin is the outermost covering of our body. It is the sensory organ for touch and feel.

Parts of Skin

- The teacher should guide the learners to carry out **Activity 2** given in the Pupil's book.

Activity 2: Identifying the Parts/Layers of Human Skin

Step 1: The teacher should ask the learners to use a hand lens to observe different types of skin:
  - on the head
  - in the palm of the hand
  - on the arm.

Step 2: He/She should ask them to compare their findings with those of the other.

Step 3: He/She should ask them to use the Internet to find out the numbers of layers in the skin and the functions of each layer.

- After the activity, the teacher should discuss with the learners the three layers of the skin: **epidermis, dermis** and **hypodermis**.

Functions of Skin

- The teacher should ask the learners to carry out **Activity 3** given in the Pupil's book.

Activity 3: Exploring the Function of Skin

Step 1: The teacher should ask the learners to run around their playground twice.

Step 2: He/She should ask them to observe their skin and tell what is formed on their skin.

- After the activity, the teacher should tell the learners that the substance they see is sweat.
- He/She should then discuss the main functions of skin.

Properties of Skin

- The teacher should discuss with the learners the properties of skin.

Hygiene of Skin

- The teacher should discuss with the learners the ways to keep our skin clean.

Skin Diseases

- The teacher should ask the learners to carry out **Activity 4** given in the Pupil's book.

Activity 4: Exploring the Common Skin Diseases

Step 1: The teacher should ask the learners to observe the pictures given in the activity.

Step 2: He/She should ask them what these pictures show.

Step 3: He/She should ask the learners to search information on some common skin diseases in library books or from the search engines like Google and Yahoo.

Step 4: He/She should ask them to make a report and discuss on it.

- Thereafter, the teacher should ask the learners to read the matter on common skin diseases given in the Pupil's book and discuss the symptoms of each disease.

Skin Accidents and First Aid

- The teacher should ask the learners to carry out **Activities 5 and 6** given in the Pupil's book.

Activity 5: Exploring the Skin Accidents

Step 1: The teacher should ask the learners to observe the pictures given in the Pupil's book.

Step 2: He/She should ask them to tell what these pictures show.

Step 3: He/She should ask them to tell the causes and signs of each skin accident.

- The teacher should thereafter discuss with the learners some of the common skin injuries such as **wounds, bruises, burns** and **scalds** and the first aid interventions required for each type of skin injury.

Activity 6: Role Playing a Skin Accident

Step 1: The teacher should ask the learners to suppose that one of their friends has a skin accident. He/She has severe wounds on his/her skin. What would they do?

Step 2: The teacher should form a team of two learners each. One learner will act as a victim. The other learner will provide him/her necessary first aid.

Lesson 3: Structure, Function and Maintenance of Tongue

- The teacher should introduce the lesson by guiding the learners to carry out **Activity 7** given in the Pupil's book

Activity 7: Identifying the Parts of the Tongue

Step 1: The teacher should ask the learners to look in a mirror and observe their tongue.

Step 2: He/She should ask them to discuss their findings in the class.

Parts of Tongue

Activity 8: Tasting Food Samples

Step 1: The teacher should arrange for different food samples that are sweet, salty and sour.

Step 2: He/She should guide the learners to use a toothpick and place each of the samples on different parts of the tongue at once.

Step 3: He/She should ask them to observe and find out which part of the tongue can detect which taste.

- The teacher should discuss with the learners about the taste buds present in different areas of the tongue. These buds help us to taste salt, sugar and lemon.

Functions of Tongue

Activity 9: Exploring the Functions of a Tongue

- The teacher should ask the learners to carry out the activity as per the steps given in the Pupil's book.
- After the activity, the teacher should discuss with the learners the different functions of tongue.

Hygiene of Tongue

Activity 10: Discussing the Hygiene of Tongue
- The teacher should ask the learners to carry out the activity as per the steps given in the Pupil's book.
- After the activity, the teacher should discuss with the learners the importance of keeping our tongue clean.

Proper Method of Cleaning Tongue

- The teacher should discuss with the learners the proper method of cleaning tongue as given in the Pupil's book.

Tongue Disorders or Problems

Activity 11: Identifying Common Tongue Disorders
- The teacher should ask the learners to carry out the activity as per the steps given in the Pupil's book.
- After the activity, the teacher should discuss with the learners some tongue disorders, such as, **sore, swelling of tongue, black hairy tongue, loss of sense of taste,** etc., their causes and prevention techniques.

Tongue Accident

Activity 12: Identifying Tongue Accidents
- The teacher should ask the learners to carry out the activity as per the steps given in the Pupil's book.
- After the activity, the teacher should discuss with the learners some tongue accidents such as **tongue bite, burn of tongue**, their causes and signs.

Lesson 4: Structure, Function and Maintenance of the Nose

- The teacher should introduce the lesson by guiding the learners to carry out **Activity 13** given in the Pupil's book.

Activity 13: Exploring the Uses of Nose
Step 1: The teacher should ask the learners to spray perfume into a cotton wool and leave it in one corner of the room.
Step 2: He/She should ask them to wait for a few minutes and then call their friend in. Does the friend smell something?
Step 3: He/She should ask them to name the organ which helped to smell the perfume.
- After the activity, the teacher should discuss with the learners that the nose is the sensory organ for smell. It picks up air when we breathe in.

Parts of Nose

Activity 14: Identifying the Parts of a Human Nose

Step 1: The teacher should ask the learners to draw the diagram given in the Pupil's book in their science notebook.

Step 2: Ask them to identify all its parts and label them.

• After the activity, the teacher should discuss with the learners the different parts of nose such as **nostrils** and **nasal cavity** and their functions.

Functions of Nose

• The teacher should introduce the functions of nose through **Activity 15** given in the Pupil's book.

Activity 15: Discovering the Function of Nose

Step 1: The teacher should ask the learners to hold their nose tight.

Step 2: Ask them what they feel and why.

• After the activity, the teacher should tell the learners that they will feel uneasy. This is because the nose helps us to breathe. Also it helps us to smell.

Hygiene of Nose

• The teacher should introduce the topic through **Activity 16** given in the Pupil's book.

Activity 16: Discussing the Hygiene of Nose

Step 1: The teacher should ask the learners to discuss the following questions in groups:

      (i)   How often you clean your nose?

      (ii)   Why is it essential to keep the nose clean?

Step 2: Ask them to make a report on it and present to the class.

• After the activity, the teacher should discuss with the learners the importance and the ways of proper nose care.

Diseases of Nose and their Causes

• The teacher should introduce the topic through **Activity 17** given in the Pupil's book.

Activity 17: Identifying Common Nose Diseases

Step 1: The teacher should ask the learners to discuss and answer the given questions.

• After the activity, the teacher should discuss with the learners the common nose diseases such as **common cold** and **sinusitis** and their causes.

Prevention of Nose Diseases

- The teacher should discuss with the learners the measures that should be taken to prevent nose diseases as given in the Pupil's book.

Accidents of Nose

- The teacher should discuss with the learners the common nose injuries, their causes and the first aid methods in case of **broken nose** as well **nosebleed** as give in the Pupil's book.

Lesson 5: Structure, Function and Maintenance of Ear

- The teacher should ask the learners to perform **Activity 18** given in the Pupil's book.

Activity 18: Exploring the Importance of Ears

- The teacher should guide the learners to carry out this activity as per the procedure given in the Pupil's book.
- After the activity, the teacher should discuss with the learners that ears are our sensory organs of hearing.

Parts of Ear

- The teacher should ask the learners to perform **Activity 19** given in the Pupil's book.

Activity 19: Identifying the Parts of a Human Ear

- The teacher should ask the learners to perform this activity themselves.
- The teacher should discuss with the learners the three major parts of ear—the **outer ear**, the **middle ear** and the **inner ear**.

Functions of Ears

- The teacher should discuss with the learners the specific functions of the ears, i.e., hearing sound and balancing our body.

Hygiene of Ears

- The teacher should ask the learners to perform **Activity 20** given in the Pupil's book.

Activity 20: Discussing the Hygiene of Ears

- The teacher should ask the learners to perform this activity on their own.
- He/she should ask them to make a report on it and present to the class.
- After the activity, the teacher should discuss with the learners the proper way of cleaning the ears.

Diseases of Ears and their Causes

- The teacher should ask the learners to perform **Activity 21** given in the Pupil's book.

Activity 21: Identifying Diseases of Ears

- The teacher should ask the learners to perform this activity on their own.
- After the activity, the teacher should discuss with the learners that the person in the picture is suffering from ear disease.

Hearing Loss and Deafness

- The teacher should discuss with the learners the common ear diseases such as **hearing loss** and **deafness,** their **types**, their **causes** and their **cures** as given in the Pupil's book.

Conductive Hearing Loss

Activity 22: Identifying Causes of Conductive Hearing Loss

Step 1: The teacher should ask the learners to observe the picture given in the Pupil's book.

Step 2: He/She should ask them to tell what the child is doing.

Step 3: He/she should ask them to tell whether it is safe to enter foreign materials into the ears.

Step 4: He/she should also ask them to explain the reason of their answers.

- After the activity, the teacher should discuss with learners that it is unsafe to enter foreign materials such as matchstick into the ears. It may lead to conductive hearing loss. He/She should also discuss the other causes of conductive hearing loss.

Sensory Hearing Loss

Activity 23: Identifying Causes of Sensory Hearing Loss

Step 1: The teacher should ask learners to observe the two pictures given in the Pupil's book.

Step 2: He/She should ask them to tell what difference they observe between the two pictures.

Step 3: He/She should further ask them to tell what happens when a child hears loud noises every day.

- After the activity, the teacher should discuss with learners that in the first picture, the child is hearing loud noise coming from vehicles and speakers. If he hears such loud noise for a long time he may suffer from sensory hearing loss.

  Further, he/she should discuss what sensory hearing loss is and its other causes.

Deafness

- The teacher should discuss with the learners the deafness, its types, causes and prevention as given in the Pupil's book.

Lesson 6: Structure, Function and Maintenance of the Eye

- The teacher should begin the lesson by asking the learners to perform **Activity 24** given in the Pupil's book.

Activity 24: Observing the Structure of Eyes

Step 1: The teacher should ask each learner to choose a partner and face each other.

Step 2: He/She should ask them to look into the eyes of their partners closely.

Step 3: Ask them to describe the parts they see.

- After the activity, the teacher should discuss with the learners the description of eyes.

Parts of an Eye

- The teacher should begin this topic by asking the learners to carry out **Activity 25** given in the Pupil's book.

Activity 25: Identifying Different Parts of a Human Eye

Step 1: The teacher should ask the learners to draw the picture of an eye in their exercise book.

Step 2: Ask the learners to identify and label all its parts.

Layers of an Eye

- The teacher should discuss with the learners the three concentric layers of eyes as given in the Pupil's book.

Chambers of an Eye

- The teacher should discuss with the learners the three chambers of eyes—Anterior chamber, Posterior chamber and Vitreous chamber as given in the Pupil's book.

Functions of Eyes

- The teacher should begin this topic by asking the learners to carry out **Activity 26** given in the Pupil's book.

Activity 26: Exploring the Functions of Eyes

Step 1: The teacher should ask the learners to blindfold one of their friends.

Step 2: He/She should ask them to put different objects in front of him/her.

Step 3: Ask whether their friend is able to see the things. Why?

- The teacher should discuss with the learners that the blindfolded pupil cannot see the things because it is the eyes that help us to see.

Defects of Eyes and their Correction

- The teacher should begin this topic by asking the learners to carry out **Activity 27** given in the Pupil's book.

Activity 27: Identifying the Types of Eye Defects

Step 1: The teacher should guide the learners to search information on eye defects from various sources (parents, peers, nearest health facilities, printed materials and electronic sources) and their prevention.

Step 2: He/She should ask them to share the information with the class.

Step 3: He/She should ask the learners to observe the given pictures.

Then he/she should ask the learners the questions:

(i) Which disease is the girl suffering from?

(ii) Which disease is the lady suffering from?

- After the activity, the teacher should discuss with the learners the different types of eye defects, their causes and methods to correct these defects as given in the Pupil's book.

Prevention of Eye Defect

- The teacher should begin this topic by asking the learners to carry out **Activity 28** given in the Pupil's book.

Activity 28: Collecting Information on Prevention and Treatment of Eye Defects

Step 1: The teacher should ask the learners to the school library and collect information on prevention and treatment of possible eye defects.

Step 2: He/She should ask them to make a report on it and present to the class.

- After the activity, the teacher should discuss with the learners the methods of preventing eye defects.

Lesson 7: Unit Revision

The teacher should ask questions from the unit review exercises covering all lessons to assess the competences achieved by the learners.

12.10 ADDITIONAL CONTENT FOR THE TEACHER

Make copies of this worksheet and provide the learners one copy each.

HUMAN SENSORY ORGANS WORKSHEET

Name: ....   Date: ....

Observe the pictures in each row. Draw a sense organ in the box that shows each sense you would use.

12.11 WEB LINKS FOR CONTENT ENRICHMENT

- http://www.britannica.com/science/human-skin
- http://www.webmd.com/skin-problems-and-treatments/picture-of-the-skin
- http://www.webmd.com/oral-health/guide/tongue
- http://www.mamashealth.com/organs/eye.asp
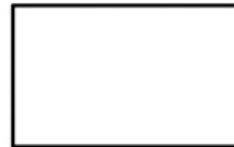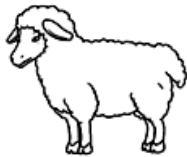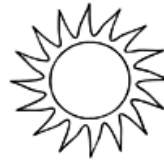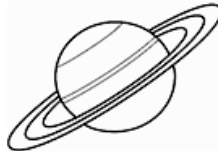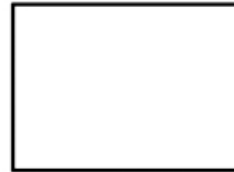
12.12 ANSWERS TO ACTIVITIES

Activity 14

1. NASAL CAVITY   2. NOSTRIL

Activity 19

1. PINNA   2. EAR CANAL
3. EARDRUM   4. HAMMER
5. ANVIL   6. STIRRUP
7. SEMI-CIRCULAR CANAL   8. AUDITORY NERVE
9. COCHLEA   10. OUTER EAR
11. MIDDLE EAR   12. INNER EAR

Activity 25

1. SCLERA   2. POSTERIOR CHAMBER
3. CORNEA   4. ANTERIOR CHAMBER
5. IRIS   6. CILIARY BODY
7. CHOROID   8. RETINA
9. OPTIC NERVE   10. VITREOUS CHAMBER

12.13 SOLUTIONS TO UNIT REVIEW EXERCISES

I. Fill in the blanks with the correct options:

1. (b)   2. (c)   3. (b)   4. (d)
5. (a)   6. (d)

II. Match the organs with their functions:

1. (d)   2. (c)   3. (b)   4. (e)
5. (a)

III. State whether the following statements are true or false:

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

IV. **Answer the following questions briefly:**

1. Sensory organs are connected to the brain through nerves. They work as follows.

    1. Each sensory organ receives stimuli such as touch, heat, cold and pressure from the environment.
    2. The sensory organ transmits this information to the brain through sensory nerves.
    3. The brain interprets this information and gives feedback to the sensory organs through motor nerves.

2. The main functions of skin include:

    1. It allows us to have a sense of touch.
    2. It protects our body from harmful germs.
    3. It regulates our body temperature.
    4. It helps to release waste products as sweat.

3. Some properties of skin include:

    1. Different people have different skin colours. Some people have light skins. Others have dark skins.
    2. Skin may be oily and dry.

4. Ringworm, eczema and scabies.

5. A bruise is a black or blue mark on the skin. It is caused by blood trapped under the skin. It happens when an injury crushes small blood vessels but does not break the skin. Bruises are often painful and swollen.

6. The main functions of a tongue are:

    1. It enables us to detect various tastes.
    2. It helps us to speak.
    3. It helps us in chewing food and rolls it into food pipe.
    4. It helps us to clean food particles stuck between gums and teeth.

7. To keep your tongue clean:

    1. Wash your mouth before and after taking food.
    2. Clean your tongue with a soft tongue cleaner.
    3. Clean your tongue twice daily—in the morning and at night.

8. The tongue is affected by a number of problems. These include:

    1. *Sore:* In case of sore, there are white or red patches seen on the tongue. Sores are often painful. A person with a sore on the tongue finds eating spicy foods difficult. Sores may be caused by viruses. Diseases like chickenpox and measles develop sore on the tongue.

If you have sore:

(a) avoid hot and spicy foods.

(b) take soft foods and cold beverages until the sore heals.

2. *Loss of sense of taste:* Sometimes people lose the ability to taste sour, salty, bitter, or sweet flavours partially or completely. Poor oral hygiene and dental problems are the causes of this. Loss of taste can create serious health issues like heart disease, diabetes, and other illnesses.

    If you have a taste disorder, consult a doctor.

3. *Swelling of tongue:* Sometimes the tongue may suddenly swell up in size. It is a symptom of disease like tongue cancer. If you have such a problem, immediately consult a doctor.

4. *Black hairy tongue:* In this case, the tongue appears to be hairy. It is caused by a course of antibiotics. It can also be developed by consuming too much of coffee and cigarettes.

    If you have black hairy tongue:

(a) scrap your tongue with a special tongue scrapper regularly.

(b) avoid smoking.

9. The following are various functions of a nose:

– It helps us to smell.

– It helps us to breathe.

– The tiny hairs and the mucus in the nose do not allow the dirt and dust to enter inside the body.

10. A clean tongue cannot be attacked by diseases. So it is important to keep our tongue clean.

    To keep your tongue clean:

– Wash your mouth before and after taking food.

– Clean your tongue with a soft tongue cleaner. You can also use a brush to clean your tongue

– Clean your tongue twice daily—in the morning and at night.

11. **Common cold:** It is a viral infectious disease. A person with common cold feels a runny nose.

    Causes of common cold: The causes of common cold include:

– Transmission of cold viruses through air-borne droplets

– Cold weather condition such as rain or winter

– Poor immune functions

– Insufficient sleep and malnutrition.

Sinusitis: It is an infection of the sinuses near the nose. This infection usually occurs after a cold. When a person suffers from sinusitis, his/her nose is blocked. He/She does not breathe well. He/She has headache and facial discomfort.

Causes of sinusitis: The causes of sinusitis include:

– Micro-organisms such as virus, bacterium or fungus
– Abnormalities in the structure of the nose
– It can be caused by allergy and irritation of sinuses.

12. The following are two specific functions of the ears:

   1. They help in hearing sound.
   2. They help in balancing our body.

13. The common ear diseases are: hearing loss and deafness.

   Hearing loss: Hearing loss is the reduced ability to hear sound. It occurs when sound waves do not reach the brain. Basically, there are two types of hearing loss:

   (i) *Conductive hearing loss*: It is due to the problem with ear canal, ear drums and middle ears. It is temporary and can be corrected.

   It can be caused by the following factors:

   ♦ Intrusion of foreign materials in the ear
   ♦ Infection in the ear canal
   ♦ Tumour in the ear
   ♦ Much ear wax in the ear canal.

   This disease is temporary. It can be cured by removing ear wax and other foreign materials from the ears.

   (ii) *Sensory hearing loss:* It is due to the problem in the inner ear. A person with such disease cannot understand what he/she is hearing. This disease is nerve-related.

   It can be caused by the following factors:

   ♦ Old age
   ♦ Injury to the ear canal
   ♦ Exposure to loud noise
   ♦ Ear infection

   This disease can be cured by:

   ♦ Treatment of ear infection
   ♦ Avoiding travel in the vehicles which produce loud sound
   ♦ Treatment of infection in the ear canal.

Deafness: Deafness is the complete inability to hear sound. It is caused by damage to the inner ear or to the nerves that send sound to the brain. Basically, there are three types of deafness. These are:

(i) *Partial deafness:* It is the condition in which a person is unable to hear properly.

It can be caused by the following factors:

♦ Intrusion of foreign materials in the ear

♦ Much ear wax in the ear canal

♦ Holes in the ear drum

This disease is temporary. It can be cured by removing ear wax and other foreign materials from the ears.

(ii) *Permanent deafness:* It is the condition in which a person is completely unable to hear. If a woman contracts German measles during pregnancy, her child may have a permanent hearing disability. In some cases, deafness is inherited from the parents to their child. This type of deafness is permanent and cannot be cured.

(iii) *Sensory deafness:* It is due to the problem in the nervous system. A person with such a disease cannot understand what he/she is hearing.

It can be caused by the following factors:

♦ Disease of the blood vessel

♦ Loud noises or sounds

♦ Tumour in the ear canal

♦ Use of certain medicines (drugs) that are harmful to hearing.

This disease can be cured by:

♦ Treating the diseases of the blood vessels.

♦ Avoiding working around loud noises everyday.

♦ Removing tumour from the ear canal by surgery.

14. *Short-sightedness* is also called myopia. In myopia, a person sees near objects clearly but cannot see objects well that are far.

This defect can be corrected using a concave (diverging) lens.

Long-sightedness is also called hypermetropia. In hypermetropia, a person can see distant objects clearly, but near objects with blurred vision.

This defect can be corrected using a convex (converging) lens.

15. To prevent eye defects:

– eat a healthy diet that includes fruit and green leafy vegetables.

– avoid smoking.

– when you are outdoors, wear sunglasses that block sun's harmful UV rays.

– keep at least a distance of 25 cm when you are reading and watching TV.

– have a regular checkup of your eyes by an eye doctor.

V. Complete the crossword puzzle using the clues below:

Across	**Down**
5. Sensory organs	**1.** Tongue
	2. Nose
	3. Eyes
	4. Ears
	5. Skin

12.14 ASSESSMENT METHODS

Use observation technique, question answer technique, and demonstration technique to assess the learners' achievement of learning objectives.

12.15 ASSESSMENT

1. Name the sensory organ for taste.
2. What are sense organs?
3. In short-sightedness, a person sees near objects clearly. (True/False)
4. Name two diseases of nose.
5. Ears are the outermost covering of our body. (True/False)
6. ………….. is the complete inability to hear sound. (Deafness/Blindness)

Answers

1. Tongue
2. Organs which help us to see, hear, smell, taste and feel are called sensory organs.
3. True
4. Common cold and sinusitis
5. False
6. Deafness

UNIT 13—HUMAN SKELETON

13.1 LEARNING OBJECTIVES

At the end of this unit, the learners should be able to:

Knowledge and Understanding	Skills	Attitudes and Values
• Identify the main parts and major bones of the human skeleton. • Explain the functions of the skeleton. • State the main types of bone fractures. • Explain how to deal with bone accident. • Name and explain most common bone diseases and deformation of the vertebral column. • Explain the hygiene of the human skeleton.	• Draw and label the human skeleton. • Apply the knowledge to prevent the accidents of the bones. • Practise first aid in case of bone accident.	• Show awareness of the importance of skeleton in the human body. • Develop habits to avoid dangerous games. • Show concern about preventive measures against skeleton accidents. • Be very careful while providing first aid in case of bone accident. • Develop a good habit to do regular physical exercise and to have a well balanced diet especially eating food rich in calcium. • Develop a habit of consulting a physician both for prevention and treatment of possible skeleton deformation and bone diseases.

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13.2 CONTENTS

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                            │  Human Skeleton   │
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Main parts or major bones of skeleton	Functions of skeleton	Accidents of bones	Bone diseases	Deformation of vertebral column	Hygiene of skeleton
• Major bones of skull • Major bones of trunk • Major bones of arm and leg	• Support • Move-ment • Protection • Blood production • Storage of minerals • Endocrine regulation	• Close fractures • Open fractures	• Rickets • Bone cancer	• Scoliosis • Lordosis • Kyphosis	• Getting calcium and vitamin D • Doing physical exercises

13.3 INTRODUCTION

This unit introduces the learners to:

- skeleton and major bones of skeleton such as skull, trunk and arm.
- different functions of skeleton.
- accidents of bones such as open fracture and closed fracture.
- bone diseases such as rickets and bone cancer.
- deformation in spine, first aid of bone accident and prevention.

13.4 TEACHING AIDS

- **Audio-video:** (i) Clips showing human skeleton.
  (ii) Video showing first aid in case of accident (bone).
  (iii) Video showing importance of skeleton.
- **Visuals:** (i) Images of balanced diet.
  (ii) Images of food rich in calcium.

13.5 TEACHER'S TIP

You could start the lesson with a wall chart of human skeleton. Show the learners the various parts of body. Ask them to relate it with their own body and identify parts. Using activities make them understand the importance of bones in proper movement and

support. Aware the learners of taking precautions while playing. Ask them to immediately consult a doctor in case of any bone accident. Engage the learners in different exercises and in eating balanced diet for healthy living. Make them aware of diseases which can occur without healthy living activities. This would encourage the learners to adopt good habits in life.

13.6 TEACHING METHODS

* Observation, discussion, demonstration, and group discussion

13.7 TEACHING AND LEARNING MATERIALS

* The human skeleton model, charts, laths, wood, hard cartons, branches of the tree and bandages

13.8 LESSON PARTITION

No.	Lesson Title	Contents	Learner's Activities	Number of Periods
1.	Main Parts and Major Bones of the Skeleton	• Identification of the main parts and major bones of the human skeleton.	• **Observation:** Under the teacher's guidance, learners observe on the wall chart and refer to their own body, then name different parts of the skeleton and draw in their exercise book.	2
2.	Functions of the Skeletal System	• Explanation of functions of the skeletal system.	• **Discussion:** In small groups use the picture (diagram/drawing) and refer to their own body to discuss the functions of the skeleton, then share with the whole class.	1
3.	Accidents of Bones	• Types of bones fracture • First-Aid	• Make group discussions to find out good practices of maintaining skeleton and avoiding accidents. • **Role play simulation:** As first aid, apply a splint on an arm or leg.	2

(*Contd…*)

4.	Bone Diseases	• Names of common bone diseases	• Group research on various bone diseases from library, hall charts and search engines.	1
5.	Hygiene of the Skeleton	• Getting calcium and vitamin D • Doing physical exercise • Prevention of accidents	• Demonstration and practical: Practise some techniques of maintaining a healthy skeleton: sitting position, physical exercise, as part of hygiene.	2
6.	Prevention of Bone Diseases and Deformation of the Vertebral Columns	• Prevention of bone diseases and deformation of the vertebral column	• Practise some techniques like sitting correctly, taking regular exercise and taking nutritious diet.	1
7.	Unit Revision	• Main parts and major bones of the skeleton • Functions of the skeletal system • Accidents of bones • Bone diseases • Deformation of the vertebral column • Hygiene of the skeleton	• Answering unit review exercises.	1

13.9 TEACHING METHODOLOGY AND LEARNER'S ACTIVITIES

- The teacher should start the unit by asking brainstorming questions to the learners.
- He/She should ask the learners to imagine, if they did not have skeleton
  - o What would they look like?
  - o Would they be able to stand up?
  - o Would they be able to walk?
  - o What supports their body?
- After listening to their answers, the teacher should tell them that the skeleton supports our body. It is made up of bones. Without skeleton, we would not be able to stand up.

Lesson 1: Main Parts and Major Bones of the Skeleton

- The teacher should start this lesson by asking the learners to carry out **Activity 1** given in the Pupil's book.

Activity 1: Identifying Main Parts of a Human Skeleton
- The teacher should ask the learners to carry out the activity on their own.
- After completion of the activity, he/she should discuss with the learners that skeleton gives shape and support to our body. A skeleton comprises skull, arms and legs. Each of the major parts consists of some small bones.

(a) Major Bones of Skull
- The teacher should ask the learners to carry out **Activity 2** given in the Pupil's book.

Activity 2: Exploring Bones in the Forehead

Step 1: The teacher should ask the learners to press the top of their forehead.

Step 2: He/She should ask the learners to tell whether they feel hard or soft.

Step 3: He/She should ask the learners to tell what they think makes their forehead harder.

- After completion of the activity, the teacher should discuss with the learners the major bones of the skull—**Cranium** and **Facial bones**.

(b) Major Bones of Trunk
- The teacher should ask the learners to carry out **Activity 3** given in the Pupil's book.

Activity 3: Identifying Major Bones of Trunk

Step 1: The teacher should ask the learners to look at the given picture.

Step 2: He/She should ask the learners to identify the major bones of trunk from the given options and write in their notebook.

- After completion of the activity, the teacher should discuss with the learners the major bones of trunk–**Backbone, Ribs** and **Pelvis**.

(c) Major Bones of Legs and Arms

- The teacher should guide the learners to carry out **Activities 4** and **5** given in the Pupil's book to understand the major bones of legs and arms.

Activity 4: Identifying Major Bones of Legs

Step 1: The teacher should ask the learners to look at the given picture.

Step 2: He/She should ask the learners to identify how many long bones are there in the leg.

Step 3: He/She should ask the learners to write their names in their science notebook.

- After completion of the activity, the teacher should discuss with the learners that each leg has three major bones—**Femur**, **Tibia** and **Fibula**.

Activity 5: Identifying Major Bones of Arms

Step 1: The teacher should ask the learners to look at the given picture.

Step 2: He/She should ask the learners to identify how many long bones are there in an arm.

Step 3: He/She should ask the learners to write their names in their science notebook.

- After completion of the activity, the teacher should discuss with the learners the major bones of an arm–**humerus**, **ulna** and **radius**.

Lesson 2: Functions of the Skeletal System

- The teacher should guide the learners to carry out **Activity 6** given in the Pupil's book.

Activity 6: Discussing the Functions of Skeletal System

- The teacher should guide the learners to discuss what would happen if we did not have skeleton.
- The teacher should further discuss with the learners the functions of the skeletal system.

Lesson 3: Accidents of Bones

- The teacher should define "bone accidents" and discuss that fracture is one type of accident to the bone.

- The teacher should guide the learners to carry out **Activity 7** given in the Pupil's book.

Activity 7: Discussing the Types of Accidents of Bones

Step 1: The teacher should ask the learners to look at the picture and tell what the person is suffering from.

- After completion of the activity, the teacher should discuss that the person is suffering from fracture.
- He/She should further discuss that fractures can occur to the bones of legs, arms, head and backbones.
- He/She should discuss with the learners the signs and symptoms of fractures.

(a) Types of Fractures

- The teacher should discuss with the learners the two types of fracture—**open fracture** and **closed fracture**.

(b) First Aid for Fracture

- The teacher should discuss with the learners the first aid steps to be taken in case of a fracture.

(c) Prevention of Accidents of Bones

- The teacher should discuss with the learners the precautions we should take to prevent bone accidents.

Lesson 4: Bones Diseases

- The teacher should start this topic by asking the learners to carry out **Activity 8** given in the Pupil's book.

Activity 8: Identifying the Bone Diseases

Step 1: The teacher should ask the learners to search information on different bone diseases from different sources such as library, wall charts and search engines like Google or Yahoo.

Step 2: He/She should ask the learners to share the information in the classroom.

- After completion of the activity, the teacher should discuss with the learners the common bone diseases such as **rickets** and **bone cancer**, their **causes**, **symptoms**, **prevention** and **treatment**.

(a) Rickets

- The teacher should discuss with the learners the causes, symptoms and prevention of rickets.

(b) Bone Cancer

- The teacher should discuss with the learners the causes, symptoms and treatment of bone cancer.

(c) Deformities of Vertebral Column or Spine

- The teacher should start this lesson by asking the learners to carry out **Activity 9** given in the Pupil's book.

Activity 9: Identifying the Deformities of Spine

Step 1: The teacher should ask the learners to look at the pictures given in the Pupil's book and tell what the people are suffering from.

- The teacher should discuss with the learners that the people in the picture have deformities of spine, showing the diagram of deformities in vertebral column.
- He/She should discuss with the learners that there are three main types of deformities —**Scoliosis, Lordosis** and **Kyphosis**.
- He/She should further discuss with the learners the causes, symptoms and treatment of three main types of deformities.

Lesson 5: Hygiene of the Skeleton

Activity 10: Discussing the Maintenance of Skeleton

Step 1: The teacher should lead a discussion among the learners to find out good practices of maintaining the skeleton and avoiding accidents.

Step 2: He/She should ask the learners to make a report on it and present to the class teacher.

- Further, the teacher will discuss with the learners the steps which can improve our bone health.

Lesson 6: Prevention of Bone Diseases and Deformation of the Vertebral Columns

- The teacher should ask the learners to carry out **Activity 11** given in the Pupil's book.

Activity 11: Preventing Deformities of Vertebral Columns

- The teacher should ask the learners to observe the picture given in the activity and answer the questions asked in the activity.
- After completion of the activity, the teacher should discuss with the learners the answers to the questions and discuss the ways in which we can prevent bone diseases and deformation of vertebral column.

Lesson 7: Unit Revision

- The teacher should ask the questions from the unit review exercises covering all lessons to assess the competences achieved by the learners.

13.10 ADDITIONAL CONTENT FOR THE TEACHER

Make copies of the following worksheet and provide one copy to each learner. Ask them to draw a line from each label to the right part.

<div style="text-align: center; font-weight: bold;">HUMAN SKELETON—WORKSHEET</div>

Name: ....   Date: ....

| Shoulder blade | | Skull |

| Arm | | Backbone |

| Wrist | | Hand bones |

| Knee cap | | Upper leg bones |

| Lower leg bones | | Foot |

13.11 WEB LINKS FOR CONTENT ENRICHMENT

- http://www.ivyroses.com/HumanBody/
- http://www.innerbody.com/image/skelfov.html
- http://www.innerbody.com/image/skel06.html
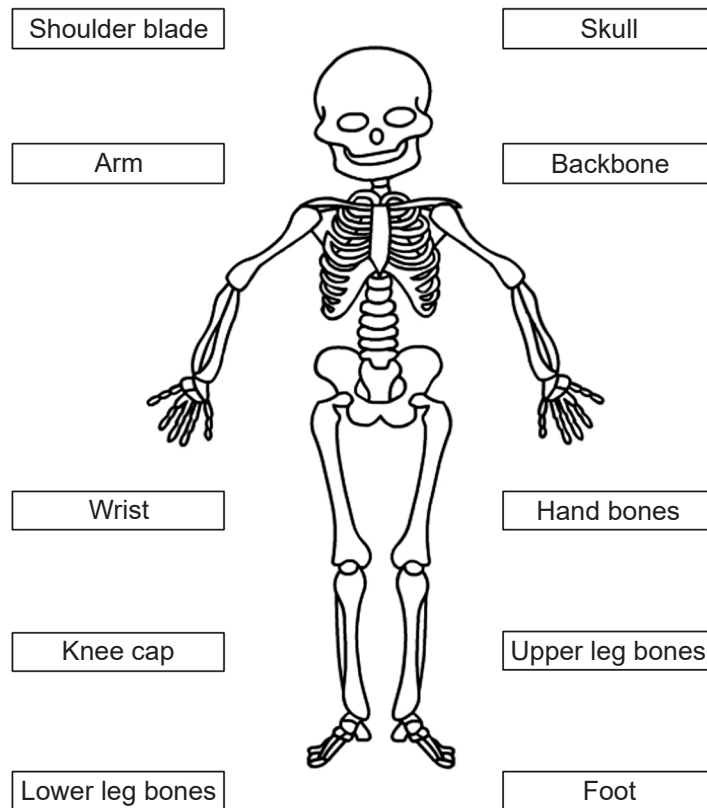
13.12 ANSWERS TO ACTIVITIES

Activity 1

1. SKULL	**2.** HUMERUS	**3.** ULNA
4. RADIUS	**5.** FEMUR	**6.** FIBULA
7. TIBIA	**8.** PELVIS	**9.** SPINE
10. RIBS.		

Activity 3

1. RIBS	**2.** SPINE	**3.** PELVIS

13.13 SOLUTIONS TO UNIT REVIEW EXERCISES

I. Fill in the blanks with the correct options:

1. (a)	**2.** (b)	**3.** (c)
4. (b)	**5.** (a)	**6.** (c)

II. State whether the following statements are true or false:

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

III. Match the bones with their functions:

1. (d)	**2.** (c)	**3.** (a)	**4.** (b)

IV. Answer the following questions briefly:

1. Our body is supported by a framework of bones. This framework is called skeleton.
2. Skull
3. Major bones of the skull are cranium and facial bones.
4. Major bones of the trunk are: the backbone, ribs, and pelvis.
5. Major bones of the leg are femur, tibia and fibula.
6. Femur

7. Major bones of the arm are humerus, ulna and radius.
8. Humerus
9. The skeletal system has the following functions:
   - It gives shape and support to the body.
   - Together with muscles it helps us to move.
   - It protects all the delicate organs like brain and heart.
10. A break or crack in the bone is called fracture.
11. Open fracture and closed fracture
12. Rickets and bone cancer; scoliosis, kyphosis and lordosis.

V. **Complete the crossword puzzle using the clues below:**

Across	**Down**
2. Skull	**1.** Trunk
3. Fracture	**2.** Skeleton

13.14 ASSESSMENT METHODS

Use observation technique, question answer technique, and demonstration technique to assess the learners' achievement of learning objectives.

13.15 ASSESSMENT

1. Which part of the skull protects and supports the brain?
2. Fracture is the break or crack in the bone. (True/False)
3. ………… is a bone disease caused due to lack of Vitamin D. (Rickets/Scoliosis)
4. Name the major bones of trunk.
5. Scoliosis, lordosis and kyphosis are bone accidents. (True/False)
6. State the function of skeleton.

Answers

1. Cranium
2. True
3. Rickets
4. The backbone, ribs, and pelvis
5. False
6. Skeleton gives shape and support to our body.

UNIT 14—MUSCLES

14.1 LEARNING OBJECTIVES

At the end of this unit, the learners should be able to:

Knowledge and Understanding	Skills	Attitudes and Values
• Differentiate the two main groups of muscles. • List the major groups of voluntary and involuntary muscles of the human body. • Identify the major functions of voluntary muscles. • Identify the accidents of muscles. • Explain the prevention of muscles' accidents.	• Apply techniques of maintaining tone of muscles. • Provide first aid in case of muscle accident. • Choose and practise appropriate exercises for maintaining specific muscle's strength.	• Develop awareness of the need of keeping healthier muscles. • Show the concern to the importance of physical exercise as a way to care for muscles. • Develop habit of consulting a physician both for prevention and treatment of possible muscles' malfunctioning.

14.2 CONTENTS

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                              ┌──────────┐
                              │ Muscles  │
                              └──────────┘
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   ┌─────────┐ ┌─────────┐ ┌─────────┐ ┌─────────┐ ┌─────────┐ ┌─────────┐
   │ Main    │ │ Major   │ │Functions│ │Accidents│ │Hygiene  │ │Prevention│
   │ groups  │ │voluntary│ │  of     │ │of muscles│ │of       │ │  of     │
   │ of      │ │muscles  │ │voluntary│ │and first│ │muscles  │ │accidents│
   │ muscles │ │of human │ │ muscles │ │   aid   │ │         │ │         │
   │         │ │  body   │ │         │ │         │ │         │ │         │
   └─────────┘ └─────────┘ └─────────┘ └─────────┘ └─────────┘ └─────────┘
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Main groups of muscles	Major voluntary muscles of human body	Functions of voluntary muscles	Accidents of muscles and first aid	Hygiene of muscles	Prevention of accidents
• Voluntary • Involuntary	• Muscles of head • Muscles of trunk • Muscles of leg • Muscles of arm	• Producing movement • Maintaining posture • Stabilising Joints	• Cramps • Massage • Drinking Plenty of fluid • Stretching	• Doing physical exercises • Avoid dangerous games	• Physical exercises • Avoid dangerous games

14.3 INTRODUCTION

This unit introduces the learners to:

- different types of muscles such as voluntary muscles and involuntary muscles.
- major voluntary muscles of human body such as major muscles of head, trunk, leg and arms.
- functions of voluntary muscles such as movement, posture and joint.
- accidents of muscles and their prevention, and hygiene of muscles.

14.4 TEACHING AIDS

- **Visuals:** Images showing types of muscles.
- **Video:** Clips showing first aid in case of muscles accident.
- **Audio-video:** Video showing physical exercise of caring muscles.

14.5 TEACHER'S TIP

You could start the lesson by defining muscles. Muscles are tissues in a human or animal body that has the ability of producing movement. Show them the movement of your arms. Tell them the concept of contraction and relaxation of muscles. Ask them to engage in exercises to care for their muscles. Tell them how doing regular exercise—stretching, massaging and drinking plenty of water could help them to have healthier muscles and avoid cramps. Make them aware of preventing and treating muscle malfunction by consulting a physician on regular basis. This could help them to be in a routine of consulting a doctor.

14.6 TEACHING METHODS

- Demonstration, group discussion and role play

14.7 TEACHING AND LEARNING MATERIALS

- The human muscles model and charts

14.8 LESSON PARTITION

No.	Lesson Title	Contents	Learner's Activities	Number of Periods
1.	Main Groups of Muscles	• Voluntary muscles • Involuntary muscles • Differentiation between two main groups of muscles.	• **Demonstration:** Touch the body, contract muscles and make movements of related organs in order to discover the main muscles of head, trunk, legs and arms.	1
2.	Major Voluntary Muscles of the Human Body	• Identification of the major voluntary muscles of human body.	• **Demonstration:** Touch the body, contract muscles and move organs like head, the trunk, legs and arms.	2
3.	Functions of Voluntary Muscles	• Identification of the major functions of voluntary muscles.	• **Group discussion:** Making groups to discuss the functions of voluntary muscles.	1

(*Contd...*)

4.	Accidents of Muscles	• Identification of the accidents of muscles • First Aid	• Making group discussions in order to discover good practices of maintaining muscles and avoiding their accidents.	2
5.	Hygiene of the Muscles	• Maintaining tone of muscles	• Practising physical exercise as part of hygiene of muscles • **Role play:** Simulate a first aid intervention in case of muscle accident (stretching and massage) such as a cramped muscle.	1
6.	Prevention of Accidents	• Discussing the tips to prevent accidents	• Discussing the tips to prevent accidents	
7.	Unit Revision	• Unit review exercises	• Answering unit review exercises.	1

14.9 TEACHING METHODOLOGY AND LEARNER'S ACTIVITIES

Lesson 1: Main Groups of Muscles

• The teacher should start this lesson through **Activity 1** given in the Pupil's book.

Activity 1: Muscles of Arms

Step 1: The teacher should ask the learners to make a fist bending their arm at the elbows and tighten the fist.

Step 2: He/She should ask the learners what they see.

• Through this activity the learners will be able to learn about muscles and their importance.

• After this activity, the teacher should guide the learners to group muscles through **Activity 2** given in the Pupil's book.

Activity 2: Grouping Muscles

Step 1: The teacher should ask the learners to look at the pictures of different muscles in **Activity 2** given in the Pupil's book.

Step 2: He/She should ask the following questions:

    (a)   Which of these muscles work at their will?

    (b)   Which of these muscles do not work at their will?

- After the activity the teacher should discuss with the learners that the muscles of arms and legs work at our will. These are known as **voluntary muscles.** But the muscles of heart and lungs do not work at our will. These are known as **involuntary muscles.**

- He/She should further discuss with the learners more examples of voluntary and involuntary muscles and the differences between them.

Lesson 2: Major Voluntary Muscles of the Human Body

- The teacher should begin this lesson by guiding the learners to carry out **Activity 3** given in the Pupil's book.

Activity 3: Identifying the Major Voluntary Muscles of the Human Body

Step 1: The teacher should ask the learners to touch their body.

Step 2: He/She should ask them to contract their muscles.

Step 3: He/She should ask them to move their organs such as head, trunk, legs and arms to discover the main muscles.

- Through this activity, the learners will discover the major voluntary muscles of human body, such as major muscles of head, trunk, arms and legs.

(a)   Major Muscles of the Head

- The teacher should discuss with the learners the major muscles of head such as – **Eye muscles**, **Facial muscles**, **Chewing muscles** and **Neck muscles**.

(b)   Major Muscles of the Trunk

- The teacher should discuss with the learners the major muscles of trunk.

(c)   Major Muscles of the Legs

- The teacher should discuss with the learners the major muscles of legs.

(d)   Major Muscles of the Arms

- The teacher should discuss with the learners the major muscles of arms.

Lesson 3: Functions of Voluntary Muscles

- The teacher should begin this topic through **Activity 4** given in the Pupil's book.

Activity 4: Discussing the Functions of Voluntary Muscles

Step 1: The teacher should lead a discussion among the learners on the functions of voluntary muscles.

Step 2: He/She should ask the learners to make a report on it and present it to the class.

- After the activity, the teacher should discuss with the learners the major functions of voluntary muscles.

Lesson 4: Accidents of Muscles (Cramp) and First Aid

- The teacher should introduce this lesson through **Activity 5** given in the Pupil's book.

Activity 5: Discussing the Cramps

- The teacher should ask the learners to observe the picture given in the activity and answer the following questions.
  - − What is the footballer suffering from?
  - − What is a muscle cramp?
  - − What are the causes of muscle cramps?
- After the activity, the teacher should discuss with the learners the answers to these questions.

First Aid for Muscles (Cramp)

- The teacher should start this lesson through a role play activity.

Activity 6: Role Play a Muscle Accident

Step 1: The teacher should present a situation that if one of the learner's friends has muscle cramp what he/she will do.

Step 2: He/She should ask the learners to form a group of two pupils each.

Step 3: He/She should ask one learner of the group to act as a victim and the other learner will provide him/her necessary first aid.

- After completion of the activity, the teacher should discuss with the learners the steps to be taken if one suffers from muscle cramp.

Lesson 5: Hygiene of Muscles

- The teacher should start this lesson through **Activity 7** given in the Pupil's book.

Activity 7: Discussing the Good Practices of Maintaining Muscles

Step 1: The teacher should lead a discussion among the learners to discover good practices of maintaining muscles and avoiding their accidents.

Step 2: He/She should ask the learners to make a report on it and present it to the class.

- After completion of the activity, the teacher should discuss with the learners the care that should be taken for healthy muscles.

Maintaining Tone of a Muscle

- The teacher should define "Muscle Tone" as given in the Pupil's book and guide the learners to understand that its purpose is to keep the muscles ready for action.

- He/She should further discuss the things that can be done to maintain muscle tone such as eating nutritious food, drinking plenty of water and doing strength training exercises to reduce fat.

Lesson 6: Prevention of Accidents

- The teacher should discuss the tips that should be followed to prevent accidents during physical exercises such as warming up, cooling down, etc.

Lesson 7: Unit Revision

- The teacher should ask questions from the unit review exercises covering all lessons to assess the competences achieved by the learners.

14.10 ADDITIONAL CONTENT FOR THE TEACHER

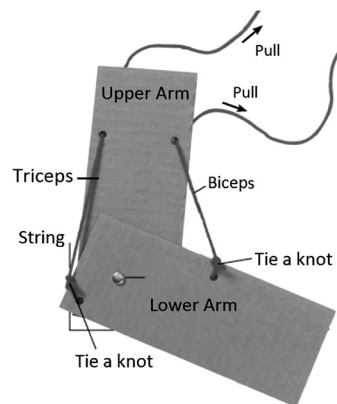- The teacher can perform the following activity in the school.

Activity A-1

Aim: To show how muscles work

You will need: Two cardboards, a fastener, two yarns and a nail to punch.

Procedure

1. First make a model arm. To make a model arm:
   (i) Make 6 holes in the cardboard.
   (ii) Use a fastener to hold these two pieces of card-board.

2. Thread yarn through the other holes and tie two knots.

3. Move the model arm by pulling one piece of yarn. Then put the arm in its original bent position. Make it move again by pulling on the other piece of yarn.

4. Observe how the model arm moves when you pull each string.

5. Record your observations in the following table.

String pulled	How the model arm moves
Biceps string pulled	
Triceps string pulled	

14.11 WEB LINKS FOR CONTENT ENRICHMENT

- http://home.epix.net/~tcannon1/physioweek4.htm

- http://boneandspine.com/types-of-muscles-and-there-functions/

- http://www.mayoclinic.org/diseases-conditions/muscle-cramp/

14.12 SOLUTIONS TO UNIT REVIEW EXERCISES

I. Fill in the blanks with the correct options:

1. (a)   **2.** (a)   **3.** (b)   **4.** (a)

5. (a)

II. State whether the following statements are true or false:

1. True   **2.** False   **3.** True   **4.** True

5. False

III. Match the muscles to their functions:

1. (e)   **2.** (c)   **3.** (b)   **4.** (a)

5. (d)

IV. Answer the following questions briefly:

1. Muscles are soft tissues found in our body. They cover our bones and help to move them. Bones and muscles work together to move our body.

2. Two main types of muscles in our body are: voluntary muscles and involuntary muscles.

3. Eye muscles and facial muscles.

4. Major functions of voluntary muscles are:

(i) *Producing skeletal movement*: Contraction and relaxation of muscles allow the bones to move.

(ii) *Maintaining posture and body position*: Good posture depends on the strength of muscles. A person with strong muscles can maintain upright posture.

5. A–Biceps; B–Triceps

6. Muscle cramp is caused due to poor physical condition, dehydration and muscle fatigue.

7. If you have a muscle cramp:
   (a) Stretch the cramped muscle to increase flexibility.
   (b) Gently massage the cramped muscle.
   (c) Drink plenty of water.
   (d) Take a hot water bath.

8. For healthy muscles, the following care should be taken:
   (a) Take good food and pure air.
   (b) Avoid dangerous games.
   (c) Sit, walk and stand in a correct posture.
   (d) Do physical exercise regularly.

V. **Complete the crossword puzzle using the clues below:**

Across	Down
3. Involuntary	1. Joint
4. Cramps	2. Muscle

14.13 ASSESSMENT METHODS

Use observation technique, question answer technique, and demonstration technique to assess the learners' achievement of learning objectives.

14.14 ASSESSMENT

1. Muscles that work at our will are called ………… muscles. (voluntary/involuntary)
2. Muscles of arms and legs are involuntary muscles. (True/False)
3. List any two major involuntary muscles.
4. What are muscles?
5. ………… are the sudden contraction of muscles. (Bruise/Cramps)
6. Together with bones what else helps in the movement of our body?

Answers

1. voluntary
2. False
3. Muscles of stomach and heart.
4. Muscles are soft tissues found in our body.
5. Cramps
6. Muscles

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3. *Science Teacher's Guide 5*, Ministry of Basic and Secondary Education, Republic of Gambia
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