

Science and Elementary Technology

For Rwandan Schools

Teacher's Guide



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Introduction

Background

Teaching Elementary Science to P5 children is critical for establishing a foundation for further success in science and for coping with the demands of the 21st century. Furthermore, technology in education constitutes added value not only in developed countries but also in developing countries such as Rwanda. In this case, the love and interest in science and technology begins in primary school where young children tend to be more curious and motivated to learn. Science and technology inclusion in Primary Schools plays a vital role in all aspects of our daily lives, at work, at school and at home. Most importantly, it cultivates a positive attitude towards science and provides pupils with opportunities to experience the excitement of working as a scientist.

The ambition to develop **a skill-based society** and **to match the growing competition in the regional and global jobs market** has necessitated the shift to a competence-based curriculum. This aims at addressing the issues of lack of **appropriate skills** in Rwandan education system.

Learners will now get the opportunity to apply what they have learned in real life situations and to make a difference in their own lives. They will be helped to obtain all these by a teacher whose role is to ensure the success of the curriculum delivery.

The major focus of the primary school curriculum:

- Basic education must provide a solid foundation upon which literacy, numeracy, language social and life skills are built.
- Emphasis on skills like **problem-solving** and **interpersonal communication**. In addition to these, strive to develop specific skills in basic literacy and numeracy, language skills and financial literacy.
- A strong focus on Science, English, ICT and Entrepreneurship. These are fundamental areas that lay a foundation for economic development.

Science and Elementary Technology (SET & ICT) Rationale

This integrated subject is offered at primary level. The subject provides a very good foundation for the study of science subjects in the post-primary setting.

Most importantly, it cultivates a positive attitude to science and gives learners opportunities to experience the excitement of working as a scientist. Learners will also experience the values of integrating ICT in their learning as they interact with the computer in the classroom.

It provides opportunities for them to use integrated concepts, skills and processes to carry out investigations, exploration and research to explain the situations around them.

Subject Objectives

Science and Elementary Technology and ICT helps learners to:

- Develop an interest in science as a body of knowledge and methods of thinking, inquiring and working with others.
- Develop a concern for what is happening in our surrounding and the importance of science in relation to this.
- Help children realize the importance of technology for society and the need for scientific knowledge to understand the present technological age.
- Develop positive attitudes, practical skills and basic scientific concepts.

Key features of Primary Five Teacher's Guide

This Primary Five Science Teacher's Guide is prepared for Primary Five teachers. It strongly emphasizes learning outcomes, subject competencies, language competencies, life skills and values and cross cutting issues. The learning outcomes must be aligned to the aims and objectives of teaching primary education and eventually to the national goals of Education.

This Teacher's Guide has been designed to guide the teacher so as to bring out value and relevance of learning all around other than just the SET lessons.

This Teacher's Guide must be used together with the Pupil's Book to help the teacher in implementing the various teaching methods and relevant content.

Methods and approaches should be more of practical and based on the experiences of the learners. Effectively use methods that allow learners to explore, discover, try various procedures, collaborate and solve problems practically.

The Science teacher is expected to carry out formative assessments from time to time to check whether learners understand the concepts and procedures correctly. As a Science teacher, understand that some learners in your class are exceptional and it is your duty to arrange activities provided based on learner ability.

The Teacher's Guide for Primary Five has provided the expected answers for most of the Activities, Practice Activities and Revision Activities.

How to Use this Teacher's Guide Effectively

The Teacher's Guide addresses the teacher. The teacher as the only sole user of the Teacher's Guide has to compare the Pupil's Book and the Teacher's Guide before lesson planning or teaching is done.

The requirements given are; content, learning outcome, life skills, values, competencies, suggested Learning/teaching methods, suggested Learning/teaching materials, suggested teaching/learning Activities, suggested teaching/learning steps and the expected answers.

The suggested teaching steps have been stipulated for each respective lesson in the Pupil's Book and pages referred to for proper guidance.

The teacher's work will also be more of a facilitation role after introducing lesson concept.

During the teaching/learning process you are expected to use the most effective learner centered methods and techniques such as exploration, pairing, and group work.

Use various relevant sources of information to enrich your content approach and to help you prepare the correct content on the topic. It is crucial that you regularly relate Science to real life situations and experiences.

Note: All schools in Rwanda do not have the same learning environment. You are advised to freely use examples, which provide the learners with opportunity to acquire same knowledge, concepts, skills, values and competencies as those in other regions.

The methods used should be able to arouse interest in the learners and they must see how Science is used in solving problems.

The teaching methods should encourage learners' active participation.

Allow the learners to get actively involved in the learning process. Let them explore, ask questions, role-play, dramatize, discuss and discover to help learners be independent. The teacher's role is to guide the learners when they are doing the activities.

Approaches to the Teaching/Learning Methods

All learner-centered methods are applicable but they should be within the abilities of individual learners. Individualised Educational Programme (IEP) are crucial. Use analysis method for learners who are visually impaired or who are both deaf and blind. Sign language is vital for the hearing impaired and deaf learners.

The use of drama and role-play encourages learners participation at all ability levels and supports skills of speaking and listening.

Teaching/Learning Materials

Teaching/Learning materials are also called **Instructional Materials**.

Teaching/Learning materials aid teaching and learning. They should be prepared before the teaching and learning process.

Encourage learners to get involved practically in the collection or making of these materials. This helps them to understand Science; they must actively construct and develop their own knowledge of Science.

Instructional materials can be categorised into:

- Visual aids
- Audio aids
- Audio-visual aids

Some materials are real or concrete. Others are models and others are semi-concrete.

Instructional materials should always be relevant and at the level of the learners.

Importance of instructional materials

The following are some of the reasons why instructional materials are important in Science.

- Motivates learners' and makes them interested.
- Makes learning more interactive and interesting.
- Involves many senses in the learning process.
- Makes learning more concrete and enjoyable.
- Brings distant ideas into the classroom for examples through videos.
- Textbooks/written materials provide detailed information through the use of the written word.
- Non-textbook materials support active learning. They encourage learners to use all their senses.
- Audiotapes and recordings provide information through the spoken word.
- Real objects and models (touch/kinesthetic) coordinate visual representation with touch to present information.

Instructional materials for learners with special needs

(a) Modifications for learners with hearing difficulties or deaf learners

- Learner will be seated closer to the teacher so as to hear instructions or read lips.
- Learner will be provided with written instructions to read about the discussions and demonstrations.
- Those who cannot hear well can also use pictures, real objects and other materials used by the rest of the ordinary class.
- Use of amplification devices like hearing aids can play an important part in their education. The school or learners' parents can provide these aids.

(b) Modifications for learners with limited vision or blind learners

- These learners should be allowed to observe samples of science projects with their hands and for extended periods of time. They also require low vision glasses.
- They need to be provided with safe practical tools and one-on-one guidance during a demonstration of projects and practical activities. The project or practical may also be slightly adjusted to accommodate the learners' limitations or for safety reasons.
- Learner should be given ample time to exit classroom before large crowds gather outside the classroom.

- Those who are totally blind need their learning and teaching materials to be done in Braille. They may also require specially adopted learning aid like white canes, talking computers, calculators, clocks and watches.

(c) Modifications for learners with mild brain injury

- Learners should be provided with duplicate instructions for home and school. Learners will not need to remember to carry home materials to review.
- Learners will be given ample time to exist classroom with a pre-determined aid or peer before the official end of a class.
- The teacher should provide for parents e-mail or phone message communication concerning the progress and needs of their learner.
- Learners may be given special seat assignments in order to enable participation in class appropriately. Specific peers may be better equipped to articulate projects visually for these learners.
- These learners also require real objects, pictures made in different shapes and decorated with different attractive colours. However these materials should be pitched to their mental abilities.

(d) Modifications for learners with physical disabilities

- The physically handicapped or those with motor impairment can use materials that are used by the rest of the ordinary class and can be assisted.
- Learners will be given ample time to exist classroom with a pre-determined aid or peer before the official end of a class.
- Assistive aids such as crutches or wheelchairs should be provided to learners who are totally immobile.

Developing instructional materials

This involves creating or making instructional materials for use in a teaching/ learning situation. The materials should be functional, attractive and appealing to the learners.

You are encouraged to improvise where no instructional materials are available to demonstrate a particular learning activity.

Encourage learners to make their own instructional materials and carry them to school.

Activities

Learners should be encouraged to come up with their own relevant activities.

You should vary your activities and encourage practical activities most of the time. Design activities that enable you develop both the subject and language competencies.

Practical work like participating in fieldwork, discussing in groups, answering oral and written questions and learner centred activities are mostly preferred in the

instruction of Science. The activities you use will also enable you develop the different skills like the life skills and values and the Science process skills.

Several exercises or assignment have been provided for the learners on each topic. You can also develop your own activities, exercises and projects provided they are relevant to the topic/Unit. All activities in the Pupil's Book are linked to the topic area, competence and content.

Learning organisation during activities

Distribute learners into small discussion groups. You can reshuffle members of the groups any other time depending on how they work with each other. Always assess progress of learners in these groups and be gender sensitive. When assigning groups, use similar number of gender e.g. 2 boys - 2 girls or 3 boys – 2 girls and vice versa. Never use 1 girl – 3 boys or 1 boy- 3 girls as outweighed learners may be intimidated.

Allow learners to choose their pair-share partners for you to know their interactivity and cooperation members.

Safety: precautions during field work or project work or class activities

- During fieldwork, project work or class activities you should engage all learners in learning activities irrespective of their gender.
- Learners should also be cautioned on the use of sharp objects like scissors, knives, razor blades. Care should be taken if contact with unfamiliar animals during practical activities.
- Give learners clear instructions before they begin any practical work.
- You should give clear guidance on real safety rules during project work.
- Learners should also take care of the instructional materials so that they can be used later.
- You also caution learners against taking the liquids or food substances that have already been used during the planned activities.

Assessment Guidelines

Characteristics of a good assessment tool

- It should support learning or complement learning.
- Set tasks should be valid (at the learners level) and reliable (adequately test all the competencies set out in the area of study).
- Be fit for its purpose for instance, placement of learners, diagnosis of learners weaknesses, supporting learning.

(a) Formative assessment

It is assessment for learning. It is part of every day's teaching and learning.

The teacher collects evidence about progress of pupil's learning by:

- Observing their activities
- Listening to their discussions and presentations
- Giving them effective oral questions (interrogations)
- Giving them assignments or practical tasks (both class and carry home) allow for both group and individual assessment.
- Reviewing tasks given to learners and provide feedback.

Example:

Topic : Carpentry Tools

Sub-topic : (a) Identification of carpentry tools

(b) Usage and Maintenance of carpentry tools

(c) Dangers of carpentry tools and how to avoid them.

How to assess the subtopic: Usage and maintenance of carpentry tools.

Allow learners to visit a nearby workshop. Let them use and maintain available carpentry tools.

- When pupils are using the tools;
- Observe how they handle the tools; do they use the tools **carefully** and **correctly**?
- Are they able to apply laid down safety measures while handling the tools?
- Are they able to ask for assistance when unable to use a tool?
- Ask them oral questions concerning current use and other possible uses of the tools.

Record the progress of each learner. Indicate if they are able to meet the set out competences: Learners should be able to:

- Use and maintain carpentry tools (Skills)
- Explain the use and maintenance of carpentry tools.

(b) Summative assessment

This form of assessment gives pupils, parents and teachers valuable information about a pupils overall performance at a specific point of learning. It can take place after completion of a topic, weekly at the end of the term, year or study period.

Summative assessment should take in consideration the following.

All the set objectives for a certain study area or unit.

Make use of several short assessments.

Take into account formative assessments that have been previously set in that study area.

Example : Summative test of the Topic: Carpentry tools

Write down all the expected learning objectives in the three subtopics of the unit.

Set assessment tasks according to the objectives stated.

For example

On the subtopic; **Identification of carpentry tool**

Give them real tools and/or pictures of the tools for them to say or write down their names. Here you can employ oral questions or written gap filling questions accompanied by pictures.

On the sub-topic: **Usage and Maintenance of carpentry tool and dangers of carpentry tools and how to avoid them.**

Give learners short practical's on usage and maintenance of tools. Observe if they can use the tools effectively and carefully to avoid dangers of carpentry tools. Allow them to carry out maintenance practices on the tools as well. You can also interrogate individual learners to test their communication skills. Observe their activities and award marks.

Provide essay questions to test on ways of protecting themselves from dangers of carpentry tools that they did not use.

Give them structured questions and multiple-choice questions to test all the three subtopics.

Summative tests should be given to each individual learner since they serve as conclusive and placement tests.

Assessment of learners with special needs

This is done in two ways.

- Assessment of progress in a given task.
Involves finding out if learners are grasping what is being taught in a given task. It may also involve comparing their pace of learning a particular concept to that of other learners.
- Functional assessment.
Involves finding out the efficiency of the remaining senses. Learners with severe learning needs should be given functional assessment.

A Content Map

A content map is a summarised collection of related topics and sub-topics. It gives a guide on what and how each unit and its sub-topics can be handled.

Unit	Unit 1: Carpentry Tools	Unit 2: Masonry tools
Number of Lessons	8	6
Introduction	<ul style="list-style-type: none"> • Identifying different carpentry tools. • Proper use of carpentry tools. • Maintenance of various carpentry tools. • Dangers of carpentry tools. 	<ul style="list-style-type: none"> • Identifying different types of masonry tools. • Proper usage and maintenance of masonry tools. • Dangers of masonry tools.
Classroom Organisation	<ul style="list-style-type: none"> • Whole class orientation, group work and then individual work 	<ul style="list-style-type: none"> • Whole class orientation group work then individual work.
Learning/Teaching Materials	<ul style="list-style-type: none"> • Workbench, wood saw, T-square, claw hammer, mallet, plane, wood chisel, axe, screw driver, brace, clamp, rule, bow saw, spirit level and auger. 	<ul style="list-style-type: none"> • Masonry tools such as water level, trowel, T-square, plumb line, shovel, jointer, metre ruler, brick hammer, masonry chisel, steel float. • Charts and pictures showing masonry tools. • Paper and pen.
Activities	<ul style="list-style-type: none"> • Observation • Visit a carpentry work shop • Observe tools in use and take notes • Group discussions on how various tools can be used and their maintenance practises. • Questionnaires for learners on how various carpentry tools can be used and the safety precautions to be observed. 	<ul style="list-style-type: none"> • Class visit to a construction site to observe, use and maintain masonry tools. • Taking notes during the visit. • Group discussion to group masonry tools according to their uses.

Competencies Practised	<ul style="list-style-type: none"> • Team work • Practical work • Taking responsibility • Critical thinking 	<ul style="list-style-type: none"> • Team work. • Practical work • Assuming responsibility • Critical thinking.
Vocabulary Acquisition	<ul style="list-style-type: none"> • Names of various carpentry tools. • Terminologies associated with use and maintenance of carpentry tool. 	<ul style="list-style-type: none"> • Names of various masonry tools. • Terminologies associated with use and maintenance of masonry tools.
Study Skills	<ul style="list-style-type: none"> • Observation • Demonstration • Manipulation 	<ul style="list-style-type: none"> • Demonstration • Observation • Manipulation
Revision	<ul style="list-style-type: none"> • Practical Activities and unit Revision Activity 	<ul style="list-style-type: none"> • Practice Activities and Revision Activity
Assessment	<ul style="list-style-type: none"> • A formative assessment on the ability to work as a team and the ability to identify commonly used carpentry tools. • Formative assessment to evaluate correct usage and maintenance of carpentry tools. • Summative assessment to review all that was learnt. 	<ul style="list-style-type: none"> • Formative assessments on a learners' ability to identify, correctly use and maintain masonry tools.
Learning Outcomes	<ul style="list-style-type: none"> • Understanding the importance of carpentry tools. • To be able to use and maintain carpentry tools • Practise safe use of carpentry tools. 	<ul style="list-style-type: none"> • Understanding the importance of farm tools. • Correctly use and maintain masonry tools. • Practice safe use of farm tools.

Unit	Unit 3: Objects Production	Unit 4: Computer my Friend
Number of Lessons	14	9
Introduction	<ul style="list-style-type: none"> • Making toys and utility and learning tools. • Safely use and play with various utility and learning tools. • Maintain utility and learning objects. 	<ul style="list-style-type: none"> • Meaning of data, memory and their roles • Internal and external storage • RAM, ROM and their roles • Saving documents in storage devices • Sharing documents
Classroom Organisation	<ul style="list-style-type: none"> • Whole class orientation, group work then individual work 	<ul style="list-style-type: none"> • Whole class orientation, pair and share then individual work
Learning/Teaching Materials	<ul style="list-style-type: none"> • Clay, straws, sticks strings thread hammer, short nail, paper, glue, wood drill, wood, manila paper. • Pair of scissors. 	<ul style="list-style-type: none"> • School or public computer access • Access to XO laptops • Internet access • Notebooks • Pen • Chalk • Board/Smart board
Activities	<ul style="list-style-type: none"> • Class demonstrations on how to make various learning and utility tools. • Teacher to conduct class supervision as the pupils carry out activities of making specific utility and learning objects. • Each learner to be given a project of making a specific learning object. 	<ul style="list-style-type: none"> • Teacher's explanation to the learners about meaning of data, memory and their roles • Teacher's explanation of RAM and ROM to the learners with the roles they play • Teacher's demonstration to the learners on how to save and open saved documents • Teacher's demonstration to the learners on how share documents

Competencies Practised	<ul style="list-style-type: none"> • Team work • Practical work • Creativity • Taking responsibility 	<ul style="list-style-type: none"> • Defining and explaining data, memory and understanding its role. • Defining and explaining ROM and RAM and understanding their roles. • Practicing saving and opening saved documents. • Practicing sharing documents with colleagues.
Vocabulary Acquisition	<ul style="list-style-type: none"> • Names of locally available materials used in making toys and learning materials 	<ul style="list-style-type: none"> • Common terms used in data, memory, storage and sharing.
Study Skills	<ul style="list-style-type: none"> • Manipulation • Discussion • Demonstration 	<ul style="list-style-type: none"> • Group demonstration • Observation • Experimentation and Exploration • Question and Answer
Revision	<ul style="list-style-type: none"> • Practice Activities and Revision Activity 	<ul style="list-style-type: none"> • Practice Activities and Unit Revision Activity
Assessment	<ul style="list-style-type: none"> • Direct observations as the learners' work making utility objects. • Giving project work and awarding marks for the objects made by individual learners. 	<ul style="list-style-type: none"> • Formative assessment through activities that test learners' ability to explain terminologies, roles and procedures.
Learning Outcomes	<ul style="list-style-type: none"> • Knowing the locally available materials used in making various utility objects • Be able to make objects for playing, learning and general utility 	<ul style="list-style-type: none"> • Proper explanation of terminologies • Proper use of procedures

Unit	Unit 5: Writing Skills	Unit 6: Computer Research
Number of Lessons	5	8
Introduction	<ul style="list-style-type: none"> • Creating tables, columns and rows. • Inserting pictures and images. • Resizing and positioning image or picture. • Providing text relating to imported images. 	<ul style="list-style-type: none"> • Purpose of browse activity and e-mail. • Procedure for opening, creating and sending e-mail. • How to read inbox messages. • Navigation techniques on browse. • Accessing the dictionary, textbooks, story books and the world map. • Sharing browse content.
Classroom Organisation	<ul style="list-style-type: none"> • Whole class orientation, pair and share then individual work. 	<ul style="list-style-type: none"> • Group work, pair and share then individual work.
Learning/Teaching Materials	<ul style="list-style-type: none"> • School or public computer access • Access to XO laptops • Board/Smart board • Internet access • Pen • Notebooks • Chalk 	<ul style="list-style-type: none"> • School or public computer access • Access to XO laptops • Board/Smart board • Internet access • Pen • Notebooks • Chalk
Activities	<ul style="list-style-type: none"> • Teacher's demonstration on how to create tables, columns and rows. • Teacher's demonstration on how to insert pictures and images. • Teacher's demonstration on how to resize and position images and pictures. • Teacher's demonstration on how to import images. 	<ul style="list-style-type: none"> • Teacher's explanation of browse activity and e-mail. • Teacher's demonstration on how to open, create and send e-mails. • Demonstration on how to read inbox messages • Demonstration on how to navigate within browse activity window. • Demonstration on how to access the dictionary, textbooks, story books and the world map.

			<ul style="list-style-type: none"> • Demonstration on how to share browse activity content. • Correct explanation of browse activity terms. • Ability to open, create and send e-mails. • Practise effective navigation skills. • Ability to access the dictionary, textbooks, story books and the world map. • Practise sharing browse activity content. • Terms associated with computer research.
Competencies Practised	<ul style="list-style-type: none"> • Practicing how to create tables, columns and rows. • Inserting pictures and images. • Resizing and positioning images and pictures. 		<ul style="list-style-type: none"> • Group demonstration • Observation • Experimentation and Exploration • Question and Answer • Practice Activities • Unit Revision Activity • Project Based Activities
Vocabulary Acquisition	<ul style="list-style-type: none"> • Terms associated with write activities. 		<ul style="list-style-type: none"> • Formative assessment through activities that test learners' ability to use browse for opening e-mail account, reading inbox messages and effective navigation techniques. • Proper explanation of browse activity terminology. • Work in pairs to open new e-mail account. • Ability to read inbox messages. • Practical knowledge on how to navigate effectively.
Study Skills	<ul style="list-style-type: none"> • Group demonstration • Observation • Experimentation and Exploration • Question and Answer 		
Revision	<ul style="list-style-type: none"> • Practice Activities and Unit Revision Activity. 		
Assessment	<ul style="list-style-type: none"> • Formative assessment through activities that test learners' ability to insert tables, columns, rows, images and resize images or pictures. • Effectively insert tables, columns, rows and images. • Ability to resize images and pictures. 		
Learning Outcomes			

Unit	Unit 7: Programming for Children	Unit 8: Water
Number of Lessons	20	16
Introduction	<ul style="list-style-type: none"> Using Turtle Art commands to draw shapes. Using the number palette to complete arithmetic operations. Create dialogues and cartoons using spriting and paint options. Command, speeches and organization of scripts. Group work, pair and share then individual work. 	<ul style="list-style-type: none"> Importance of water and sources of water. Identifying water pollutants, water purification methods and water storage.
Classroom Organisation	<ul style="list-style-type: none"> Group work, pair and share then individual work. 	<ul style="list-style-type: none"> Whole class orientation, group work and then individual work.
Learning/Teaching Materials	<ul style="list-style-type: none"> Internet access Notebooks Chalk School or public computer access XO laptop Sugar on a stick Pen Board/Smart board 	<ul style="list-style-type: none"> Water Charts Books Small gravel, clean sand, coarse sand, charcoal, clean cotton tissue, paper filter, beaker and plastic bottle.
Activities	<ul style="list-style-type: none"> Demonstration on how to draw shapes using Turtle Art commands. Demonstration on how to use Forward, Left/Right and repeat commands. Demonstration on how to use the number palette. Demonstration on how to create dialogues and cartoons. Demonstration on how to use command, speeches and organization of scripts. 	<ul style="list-style-type: none"> Field visits for learners to observe water sources Taking notes during the visit Group discussion Learners to set an experience on purification of water. Field visit to outline methods of protecting the environment from rain water.

<p>Competencies Practised</p>	<ul style="list-style-type: none"> • Team work • Problem solving • Exploration and manipulation • Observation and recording • Communication • Critical thinking 	<ul style="list-style-type: none"> • Investigating/research • Recording findings and preparing finding for presentation. • Presentation of findings.
<p>Vocabulary Acquisition</p>	<ul style="list-style-type: none"> • Terms associated with Turtle Art Activity and Scratch Activity. 	<ul style="list-style-type: none"> • Importance of water. • Properties of water. • Components of water cycle. • Water pollution terminologies.
<p>Study Skills</p>	<ul style="list-style-type: none"> • Demonstration • Observation • Experimentation and Exploration 	<ul style="list-style-type: none"> • Communicating ideas through discussion. • Analysing data and drawing conclusion. • Individual pupil work.
<p>Revision</p>	<ul style="list-style-type: none"> • Practice Activities • Unit Revision Activity • Project Based Activities 	<ul style="list-style-type: none"> • Practice Activities and Unit Revision Activity.
<p>Assessment</p>	<ul style="list-style-type: none"> • Direct observation of learners to ascertain if they can effectively apply programming skills. • Continuous Practice Activities that test what learners have learnt in this unit. 	<ul style="list-style-type: none"> • Let learners have peer assessment where they record into their books. • Practical procedures and conclusions for investigating steps for making simple water cycle and steps of purifying water. • Learners to exchange their notes and marks on each other's work.
<p>Learning Outcomes</p>	<ul style="list-style-type: none"> • Understand how to use Turtle Art to draw Geometric shapes. • Apply their knowledge on the use of Scratch Activities to create programs. 	<ul style="list-style-type: none"> • Understand what a simple water cycle is. • Understanding the purification process of water and make water filter.

Unit	Unit 9: Soil	Unit 10: Animals
Number of Lessons	14	12
Introduction	<ul style="list-style-type: none"> • Preparing soil for cultivation. • Preparation of organic and inorganic fertilisers. • Proper use of fertilisers. 	<ul style="list-style-type: none"> • Conditions of a good chicken house. • Production of chickens. • Importance of chickens. • Importance of chicken farming.
Classroom Organisation	<ul style="list-style-type: none"> • Whole class orientation, group work then individual work. 	<ul style="list-style-type: none"> • Whole class orientation, group work and then individual work.
Learning/ Teaching Materials	<ul style="list-style-type: none"> • Hand hoe, plant materials, farmyard manure, organic fertilisers, inorganic fertilisers rake, seeds. 	<ul style="list-style-type: none"> • Chicken • Chicken feeds • Books • Chicken house • Charts • Chicken management
Activities	<ul style="list-style-type: none"> • Class discussion on various methods of land preparation. • Observations of various photographs and charts showing various activities in the farm. • Groups discussions on various types of fertilisers. • Identifying various types of fertilisers. • Making different types of organic fertilisers. • Teachers assess the activities as the pupils work. 	<ul style="list-style-type: none"> • Visit a nearby chicken farm. • Take notes during the visit on requirements for starting a chicken farm and how to manage chickens. • Group presentation in class concerning chicken farming and its importance to the farmer.

Competencies Practised	<ul style="list-style-type: none"> • Data collection • Observation • Presentation of findings 	<ul style="list-style-type: none"> • Team work • Practical work 	<ul style="list-style-type: none"> • Team work • Data analysis • Communication skills • Data collection methods
Vocabulary Acquisition	<ul style="list-style-type: none"> • Names of various types of farming activities. • Name of different types of fertilisers. • Terminologies associated with various farm tools and implements. 	<ul style="list-style-type: none"> • Names of various types of farming activities. • Name of different types of fertilisers. • Terminologies associated with various farm tools and implements. 	<ul style="list-style-type: none"> • Chicken farming terminologies • Chicken diseases
Study Skills	<ul style="list-style-type: none"> • Field trip • Observation • Group work 	<ul style="list-style-type: none"> • Group discussion • Exploration • Question and answer 	<ul style="list-style-type: none"> • Taking notes • Choosing the right questions to get data required • Group discussion
Revision	<ul style="list-style-type: none"> • Practice Activity and Revision Activity 	<ul style="list-style-type: none"> • Practice Activity and Revision Activity 	<ul style="list-style-type: none"> • Practise activities and unit Revision Activities.
Assessment	<ul style="list-style-type: none"> • Observations as the pupils work using various farm tools to carry out farm activities • Practical and hands on activity as pupils prepare plots for cultivating vegetables in school compound. 	<ul style="list-style-type: none"> • Observations as the pupils work using various farm tools to carry out farm activities • Practical and hands on activity as pupils prepare plots for cultivating vegetables in school compound. 	<ul style="list-style-type: none"> • A formative assessment of proper data collecting and recording procedure. • Assessing the ability to present logical and correct information both verbally and in written form. • Ability to care for chickens. • Identify chicken diseases. • Feed chickens. • Project on poultry farming.
Learning Outcomes	<ul style="list-style-type: none"> • Differentiate between organic and inorganic fertilisers. • Being able to outline the various activities as the are carried out in the farm. 	<ul style="list-style-type: none"> • Differentiate between organic and inorganic fertilisers. • Being able to outline the various activities as the are carried out in the farm. 	<ul style="list-style-type: none"> • Practical knowledge on how to rear chicken. • Understanding the importance of taking care of the chickens. • Appreciating the benefits of chicken farming to the farmer and the country.

Unit	Unit 11: Plants and Environment	Unit 12: Digestion
Number of Lessons	10	10
Introduction	<ul style="list-style-type: none"> • Identify the different types of crops. • To be able to organise crops according to their uses. • Observe and identifying different uses of trees. • Identifying the causes and effects of deforestation. 	<ul style="list-style-type: none"> • Functions of the digestive system. • Structure, function, and stages of digestion. • Components and elements of a balanced diet.
Classroom Organisation	<ul style="list-style-type: none"> • Whole class organization. • Group work. • Individual work. 	<ul style="list-style-type: none"> • Whole class orientations, group work and then individual work.
Learning/Teaching Materials	<ul style="list-style-type: none"> • Different types of crops such as tubers, cereals, legumes and vegetables. • Charts showing different crops. • Different types of trees. 	<ul style="list-style-type: none"> • Wall charts showing the parts of a digestive system. • Different types of foods e.g. beans, maize, bananas, milk, fruits and vegetables.
Activities	<ul style="list-style-type: none"> • Identifying different types of plants. • Identifying importance of trees in general on environment. • Visit to see plants within the locality. • Taking notes during the visit. • Group discussion aiming to identify ways of conserving trees. • Planting trees within the school compound. 	<ul style="list-style-type: none"> • Learners to observe charts showing digestive systems. • Learners discuss in groups the digestion process. • Learners practise preparing a balanced diet.

Competencies Practised	<ul style="list-style-type: none"> • Teamwork • Sharing with others. • Presentation of findings. • Data collection 	<ul style="list-style-type: none"> • Research and problem solving • Co-operation • Presentation of findings • Lifelong learning • Critical thinking
Vocabulary Acquisition	<ul style="list-style-type: none"> • Names of different types of plants. • Local names of different types of trees. • Terminologies related to forestry. 	<ul style="list-style-type: none"> • Names of parts of the digestive system. • Names of the stages of digestion. • Elements of a balanced diet. • Nutritional deficiency diseases.
Study Skills	<ul style="list-style-type: none"> • Field trip • Observation • Note making. • Class presentations. 	<ul style="list-style-type: none"> • Communicating • Choosing the right ideas through discussion • Taking notes. • Practical activities concerning hygiene of digestion.
Revision	<ul style="list-style-type: none"> • Practical Activities and Unit Revision Activity. 	<ul style="list-style-type: none"> • Practical Activities and Unit Revision Activities.
Assessment	<ul style="list-style-type: none"> • Formative assessment on learners' ability to identify importance of plants to the environment. • Assess learners' ability to protect and care for trees and other plants. 	<ul style="list-style-type: none"> • Teachers to supervise learners' discussion. • Observe and listen to their presentation and award each learner marks. • Written examination to test understanding of learners, after having discussed digestion process. • Practise hygiene of digestion.
Learning Outcomes	<ul style="list-style-type: none"> • To be able to identify uses of different crops. • Discuss and explain uses of trees. • Define terms related to forestry. • Demonstrate how to care for the trees. 	<ul style="list-style-type: none"> • Understanding the digestion process. • Knowing and appreciating the parts of digestive system. • Practical knowledge on how to identify nutritional deficiency diseases and how to prevent them.

Unit	Unit 13: Reproductive Systems	Unit 14: Light
Number of Lessons	20	7
Introduction	<ul style="list-style-type: none"> • To practise the hygiene of external organs. • Identifying the external parts of male and female. • Secondary sexual characteristics in boys and girls. • Practising responsible sexual behaviour. 	<ul style="list-style-type: none"> • Light propagation • Medium for light transmission
Classroom Organisation	<ul style="list-style-type: none"> • Whole class orientation. • Group discussions. • Class presentations. 	<ul style="list-style-type: none"> • Whole class orientation, groups, work, pairing the individual work.
Learning/Teaching Materials	<ul style="list-style-type: none"> • Charts showing different parts of male and female reproductive organs. • Newsletters and magazines on responsible sexual behaviour. 	<ul style="list-style-type: none"> • Cardboards • Water • Plane mirror • Charts • Torches • Pencils • Papers
Activities	<ul style="list-style-type: none"> • Observing the charts and identifying the various parts of the male and female reproductive organs. • Group discussion on how to maintain hygiene of the reproductive organs. • Class presentations • Brainstorming ways of practising responsible sexual behaviour. • Group discussion on the physical changes during adolescence. • Group discussion on why it is important to feel comfortable when touching your own sexual organs. 	<ul style="list-style-type: none"> • Learners Practise activities that helps them investigate on how light travels through different media. • Teacher to conduct class supervision when learners are carrying out on experiments about reflection and refraction.

Competencies Practised	<ul style="list-style-type: none"> • Logical reasoning • Presentation of findings • Team work • Appreciating other people 	<ul style="list-style-type: none"> • Team work • Research and problem solving • Presentation of findings • Critical thinking
Vocabulary Acquisition	<ul style="list-style-type: none"> • Names of external male and female reproductive organs. 	<ul style="list-style-type: none"> • Terminologies associated with light propagation, light transmission, and laws of light propagation.
Study Skills	<ul style="list-style-type: none"> • Observation • Exploration activity. • Presentation of ideas in class • Demonstration 	<ul style="list-style-type: none"> • Brainstorming • Manipulation • Presentations of findings • Application of learnt concepts • Class demonstrations • Taking notes
Revision	<ul style="list-style-type: none"> • Practical Activity and Unit Revision Activity. 	<ul style="list-style-type: none"> • Practical Activities • Unit Revision Activities
Assessment	<ul style="list-style-type: none"> • Learners write reports on given topics. The teacher to read and award marks. • Learners make presentations on various topics. • Affirmative assessment on the ability to work as a team. • Practise responsible behaviour. 	<ul style="list-style-type: none"> • Let learners have peer assessment where they record in their books. • Practical procedures and conclusions for investigating how light travels through different media and experience of reflection and refraction.
Learning Outcomes	<ul style="list-style-type: none"> • To explain the importance of the human reproductive organs. • Should be able to explain how to Practise hygiene of the sexual organs. • List the sexual characteristics in boys and girls during puberty. 	<ul style="list-style-type: none"> • Team work • Understanding how light travels through different media. • Practical knowledge of reflection and refraction. • Appreciating the benefits of refraction.

Unit	Unit 15: Electricity	Unit 16: Materials
Number of Lessons	9	10
Introduction	<ul style="list-style-type: none"> • List reasons why electricity is important. • Identifying ways in which electricity is produced. • Making a simple circuit. • Materials and common tools used in electricity. 	<ul style="list-style-type: none"> • Classification of materials • Physical properties of metals • Calculation of density • Real active density
Classroom Organisation	<ul style="list-style-type: none"> • Whole class orientation. • Group discussion. • Individual work. • Field trip 	<ul style="list-style-type: none"> • Whole class orientation, groups and then individual work
Learning/Teaching Materials	<ul style="list-style-type: none"> • Bicycle dynamo • Screw driver • Switches • Wires • Solar panel • Bulbs • Dry cells • Flat iron 	<ul style="list-style-type: none"> • Bells, nails, piece of iron sheet, bricks, hoe, saucepan, wood, stones, water, cooking oil, paraffin, juice, milk, salty water, unclean water.
Activities	<ul style="list-style-type: none"> • Field trip to locations where electricity is produced. • Taking notes during the visit. • Questionnaires for learners to guide them on what to ask during the visit. • Teacher to conduct supervision as pupils make simple circuits. • Guide learners on the ways of making circuits. • Group activity to produce electricity from a bicycle dynamo and solar panels. 	<ul style="list-style-type: none"> • Practical activities in groups involving discovering the density. • Practical activities to investigate the density of different liquid materials. • Practical activities to investigate behaviour of different objects in water and relative density.

	<ul style="list-style-type: none"> • Observing charts and identifying dangers of electricity. 	
Competencies Practised	<ul style="list-style-type: none"> • Data collection • Team work • Presentation of findings • Practising to make circuits. 	<ul style="list-style-type: none"> • Team work • Manipulation • Recording findings and presentations of findings. • Communication • Investigating
Vocabulary Acquisition	<ul style="list-style-type: none"> • Names of various sources of electricity. • Terminologies related to electricity. • Words related to dangers of electricity. 	<ul style="list-style-type: none"> • Common terms associated with properties of metals and density.
Study Skills	<ul style="list-style-type: none"> • Class demonstration • Field trip • Class presentations • Group discussions. • Note taking • Group activity 	<ul style="list-style-type: none"> • Group demonstrations • Observations • Investigation • Recording findings • Presentation of ideas
Revision	<ul style="list-style-type: none"> • Practical Activities and Unit Revision Activity 	<ul style="list-style-type: none"> • Practical activities and unit Revision Activity.
Assessment	<ul style="list-style-type: none"> • Direct observation as pupils work as they produce electricity through various ways. • Continuous practise exercises. • Giving project work to groups and awarding marks as they work. 	<ul style="list-style-type: none"> • Direct observations of learners to discover the density of different materials, and behaviours of different objects in water and relative density. • Continuous Practise exercises that tests what learners have learnt in the unit.
Learning Outcomes	<ul style="list-style-type: none"> • Understanding how electricity is produced. • Construct a simple electric circuit. • Manage an electric circuit and explain its importance. 	<ul style="list-style-type: none"> • Practical approach on how to calculate relative density. • Classification of materials on metals and non-metals.

Record Keeping

Record keeping involves gathering facts and evidence from assessment instruments and using them to judge the learners' performance by assigning an indicator against the set criteria or standard.

All scores from all assessment procedures should be carefully recorded and stored in a portfolio because they will contribute to the final assessment of the learners.

When assessing you will record learners' achievements either in the individual progress record or the class progress record.

The frequency of a particular behaviour or a particular competency may be recorded for the duration of a lesson, or for a set time period within a lesson or within the learning unit.

The teacher may need to record the learners' exact response in order to redirect future instructions. The teacher may also find it helpful to record written notes describing events or incidents that occur about the learners' behaviour.

Encourage learners to also keep their own records to check on their own progress.

You can make a temporary Record Table to record each learner's progress especially during oral assessment, in group discussions or project presentations.

The sample record table shown below can be used to record learners' progress in one lesson.

Learner's name	Competencies:		Skills	Attitudes and Values
	Basic	Generic		
	Literacy – Ability to communicate	Creativity	Handling of materials	Cooperation
Learner 1	1	3	1	2
Learner 2	3	2	2	1
Learner 3	1	1	1	1
Learner 4	2	3	3	2

KEY:

1	2	3
Very good	Average	Poor

As the learners continue with their activities or discussions, go round observing them and recording in the table.

The record table is vital because it helps the teacher to know his or her weak learners and give them level appropriate work or assist them. The teacher is also able to find out the common areas of weakness in learners.

Reporting to parents

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

The most helpful reporting is to share what learners are doing well and where they need to improve. A simple scale is use of the RAG table whose colours show: meeting expectations very well, meeting expectations, and not meeting expectations.

These can be presented in a table as shown below.

Pupils name	Competencies		
	Identifying common carpentry tools	Giving uses of specific carpentry tools	Creativity and Innovation
Learner 1	Meeting expectations very well	Meeting expectations	Not meeting expectations
Learner 2	Meeting expectations very well	Meeting expectations	Meeting expectations
Learner 3	Meeting expectations	Not meeting expectations	Meeting expectations

Topic Area: Tools and Objects Production

UNIT 1 : CARPENTRY TOOLS

Number of periods: 8

Key Unit Competency

By the end of this unit the learner should be able to use and maintain carpentry tools.

Background Information

In P4, you learnt about agricultural tools. Carpentry tools are used by carpenters to make furniture. In our homes we have different pieces of furniture. Carpentry tools need to be used and maintained properly as they are source of livelihood to many. Carpentry is also a source of revenue to our country. The teacher should encourage learners to use and maintain common carpentry tools.

Learning objectives

Knowledge and understanding

- Identify the common carpentry tools used
- Explain the use of carpentry tools
- Explain the dangers of carpentry tools and their safety measures

Skills

- Draw and name different carpentry tools according to their uses
- Group carpentry according to their uses
- Store and look after carpentry tools appropriately

Attitude and values

- The learner to show concern on the importance of carpentry tools.
- Show concern to replacing worn out parts of tools.
- Show familiarity in using carpentry tools.

Summary Table of Lessons

Lesson	Content	Learner's Activities
1 Common carpentry tools	Identifying carpentry tools	<ul style="list-style-type: none">• Identifying carpentry tools.• Observing various carpentry tools.

Lesson	Content	Learner's Activities
2 Common carpentry tools.	Grouping carpentry tools	Grouping carpentry tools according to their use.
3 Use and maintenance of carpentry tools.	Usage of Carpentry tools.	Using carpentry tools for removing nails cutting wood, holding work pieces.
4 Use and maintenance of carpentry tools	Maintenance of carpentry tools.	<ul style="list-style-type: none"> • Caring and maintaining carpentry tools by oiling sharpening. Cleaning proper use and storage. • Proper storage of tools.
5 Dangers of carpentry tools.	Dangers of carpentry tools.	<ul style="list-style-type: none"> • Identifying dangerous carpentry tools. • Identifying ways in which carpentry tools can be misused.
6 Dangers of carpentry tools.	Measures against dangers of carpentry tools.	<ul style="list-style-type: none"> • Identifying and avoiding dangers posed by use of carpentry tools. • Learn safe use of carpentry tools.
7 Evaluation	Revision Activity 1	Answers theory questions in the Revision Activity 1.
8 Evaluation	Revision Activity 1	Answers practical questions in Revision Activity 1.

Cross Cutting Issues

1. Financial Education

The teacher needs to educate the learners on proper use and maintenance of tools. A lot of money is spent on buying these tools. They should therefore be handled carefully to avoid losing them or breaking. The cost of buying, maintaining and replacing tools is very high . Carpentry as is a source of livelihood to many people and this enables them to generate wealth for themselves and the country.

2. Inclusive Education

Learners of both genders, pupils with disabilities and those with different learning abilities should be taken care of during learning activities.

- Let learners with poor eyesight sit closer to the board. Allow those with poor vision to feel the tools with their hands.
- Encourage all learners to interact freely with disabled colleagues.

(a) Handling the fast learners

- Allocate them more duties and responsibilities. They can identify more carpentry tools than others.
- Allow them to practise more after finishing a theoretical task. Let them maintain and use tools.
- Assign them more application questions for them to show down and think.

Examples include:

- (a) Which one of the following maintenance practices are for the safety of the user?
- (b) Write down three maintenance practices carried out in all tools.

(b) Handling slow learners

- Pair groups them with fast learners.
- Encourage them to participate fully in the group activity and discussions.
- Allow them a chance to use and manipulate tools.
- Provide a friendly environment to them to ask and answer questions.
- Organise remedial classes to enable them have more personalised learning.
- Give them enough time to handle given tasks and responsibilities including projects and assignments.

3. Environment and sustainability

Tools can be used in conservation of our environment facing helps to protect trees and crops from animals. Learners should be encouraged to conserve and maintain environment.

4. Standardization culture

The learners should be able to appreciate quality. Always go for high quality tools. Furniture made from these tools should be of good quality. Quality goods should last long.

5. Gender education

Learners of both genders should be given equal chance in the class. A boy or a girl can be a group leader. The teacher should go for ability

Notes to the teacher

Tools help to make work easier. It would be impossible to work without tools. Carpentry tools are very important as they help during making of furniture. The learners should value tools in relation to their cost. Make the lessons interesting by exposing learners to real tools. Allows them to manipulate and observe them in use. Remind them that safety and proper use of tools should be observed at all times . using tools for a different purpose may cause in fines or damage to the tool.

Sample Competence-based Lesson Plan

Name of the School: Nyakabanda Primary School

Teacher's Name: Marie Muhoza

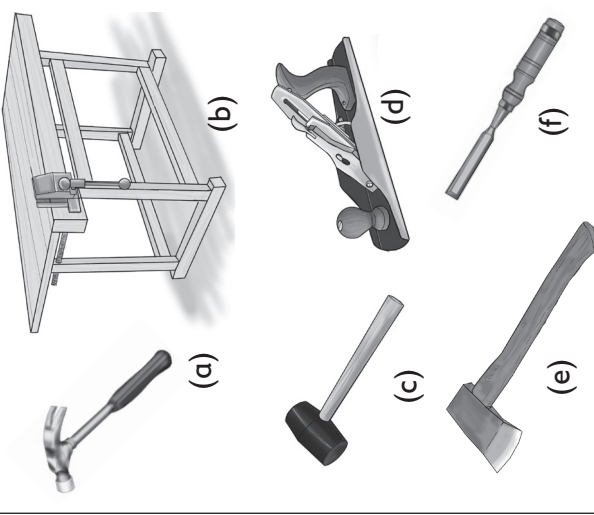
Term	Date	Subject	Class	Unit No	Lesson No	Duration	Class size
I	22/01/2017	Science and Elementary Technology	P5	1	1 out of 8	40 min	40
		Type of special education needs to be catered for in this lesson and number of learners in each category <ul style="list-style-type: none"> • Partial hearing impairment 3 • Low vision 1 					

Unit title	Carpentry tools
Key unit competence	By the end of this lesson, each learner should be able to use and maintain carpentry tools.
Title of the lesson	Identification of carpentry tools.
Instructional objectives	Using charts, pictures and real carpentry tools, the learner should be able to name and draw at least 10 carpentry tools correctly.
Plan for this lesson location (in or outside the classroom)	<p>Inside the classroom:</p> <p>All learners should be seated in a semicircle (where possible).</p> <p>Arrangement for learners with special needs</p> <ul style="list-style-type: none"> • Low vision: Assign them sitting positions at the front where they can see easily. • Partial hearing impairment: The learners should sit at the front near where they can see the learning materials, hear the teacher and lip read.. • Arrangement for learners without disabilities: To be seated in semi-circle clusters. This encourages cooperative learning at both group and class level.


Learning materials for all learners	<ul style="list-style-type: none"> • Real carpentry tools, pictures and charts. • Books showing carpentry tools. • Notebooks, pencils and pens.
References	Science and Elementary Technology Pupil's Book page 2, Teacher's Guide page 10 and any other relevant carpentry books.

Timing of each step	<p>Description of teaching and learning activity The teacher to display charts, pictures and real tools for learners to observe, draw and identify carpentry tools.</p> <p>Teacher activities</p> <ul style="list-style-type: none"> • Ask learners in pairs to describe briefly what carpentry tools are. • Ask learners to observe figures (a) to (g) on page 2 of the Pupil's Book. Allow them to discuss the pictures in groups. 	Generic competencies and cross-cutting issues to be addressed and short explanation
Introduction 7 min	<p>Learner activities</p> <ul style="list-style-type: none"> • A few learners describe briefly what carpentry tools are. <p>Possible answer: Are hand held tools that a carpenter uses to do his or her work. <ul style="list-style-type: none"> • Observe introductory pictures on carpentry tools in groups. • Discuss and answer questions orally. <p>Possible answers: (a) A brace (b) A chisel (c) A desk (d) A tape measure (e) A carpenter and a boy working.</p> </p>	<p>(a) Generic Competencies (i) Co-operation and Teamwork Learners assist each other and co-operate to describe what carpentry tools are and to identify and describe introductory carpentry tools.</p> <p>(ii) Life Long Skills Learners will relate carpentry tools to carpentry products.</p> <p>(iii) Critical Thinking Learners will predict what they are going to learn. They will also be able to talk about tools using their correct names.</p>

Timing of each step	Teacher activities	Learner activities	Generic competencies and cross-cutting issues to be addressed and short explanation
	<ul style="list-style-type: none"> • Ask learners from different groups to describe what they are going to learn in the unit. • Show a few tools to the learners for them to observe. • Let the learners mention names of tools shown. • Listen to learners' responses. • Complements learners' responses or corrects them. 	<p>(f) A chair</p> <p>(g) A man/carpenter cutting wood using a saw.</p> <ul style="list-style-type: none"> • Predict what they are going to learn in the unit. • Identify carpentry tools brought in class and give their names. 	<p>(iv) Communication You will ask learners questions and they will answer you. They will discuss in pairs or groups (talk to each other). All these activities entail communication.</p> <p>(b) Crosscutting Issues</p> <p>(i) Peace and Values Education As learners communicate, share ideas and provide answers they learn to work in peace.</p> <p>(ii) Gender Education All learners will participate in discussions regardless of their gender. The teacher will give equal chances to both boys and girls to participate in class activities.</p>

Timing of each step	Teacher activities	Learner activities	Generic competencies and cross-cutting issues to be addressed and short explanation
<p>Development of the lesson 25 min</p>	<ul style="list-style-type: none"> Ask the learners to draw all carpentry tools in Activity 1.1 (Pupil's Book pages 3 in their notebooks). (12 min). 	<ul style="list-style-type: none"> Draw all carpentry tools; Activity 1.1 (Pupil's Book page 3) in their notebooks. <p>Examples of tools drawn:</p> 	<p>(a) Generic Competencies (i) Research and Problem Solving Learners research from books and Internet to discover the identity of tools that they do not know. (ii) Co-operation and Teamwork Learners co-operate in searching for information concerning carpentry tools they do not know. (iii) Communication Skills Learners talk and share information in order to identify tools. (b) Crosscutting Issues (i) Peace and Values Education As learners communicate, share ideas and provide answers, they learn to work in peace.</p>

Timing of each step	Teacher activities	Learner activities	Generic competencies and cross-cutting issues to be addressed and short explanation
	<ul style="list-style-type: none"> Ask learners in pairs to discuss and identify the tools drawn. (5 min). (For names of tools (g) - (s), refer from Teacher's Guide page 11; Teacher's Notes) Allow them to hold some of the tools. Ask them to identify all the carpentry tools you have displayed in class (if any). (5 min) Respond to learners' questions concerning identification of carpentry tools. (3 min) 	<ul style="list-style-type: none"> In pairs, learners discuss and give names of carpentry tools shown in Activity 1.1. Possible answers: <ul style="list-style-type: none"> (a) Claw hammer (b) Work bench (c) Mallet (d) Plane (e) Axe (f) Wood chisel Hold and identify displayed carpentry tools with the help of the teacher. Asking and answering questions on carpentry tools. 	<p>(ii) Gender Education All learners will participate in discussions regardless of their gender. The teacher will give equal chances to both boys and girls to participate in class activities.</p> <p>(iii) Financial Education Learners identify carpentry tools and attach value to their usage. They also appreciate that carpentry tools are bought hence need to be taken care of.</p>

Timing of each step	Description of teaching and learning activity		Generic competencies and cross-cutting issues to be addressed and short explanation
	Teacher activities	Learner activities	
Conclusion, summary and assessment 8 min	<ul style="list-style-type: none"> Give assessment questions to individual learners on identification of carpentry tools. Possible questions: <ol style="list-style-type: none"> Name 10 carpentry tools.  <p>This is a (a) _____ it is used for (b) _____</p> Name 2 cutting tools used in carpentry. Draw a brace, hand saw, wood chisel, mallet and spirit level. Mark learners' work. 	<ul style="list-style-type: none"> Write answers in their notebooks. Possible answers: <ol style="list-style-type: none"> Wood saw, T-square, plane, axe, wood chisel, screw driver, bow saw, brace, mallet e.t.c. (a) hammer (b) driving nails in wood and removing nails from wood. Hand saw, bow saw, table saw, axe. Learners' drawings. 	<p>(a) Generic Competencies</p> <p>(i) Critical Thinking Learners recall responses they had given earlier in order to respond to individual assessment questions.</p> <p>(ii) Problem Solving Learners provide answers to given assessment questions.</p> <p>(b) Crosscutting Issues</p> <p>(i) Gender Education All learners will be given equal chances to respond to questions.</p> <p>(ii) Inclusive Education Assessment questions should be suited for all levels of learners (both slow and fast).</p>

1.1: Identification of carpentry tools

Number of periods: 2

Reference:

- Pupil's Book page 2.
- Other relevant Textbooks
- XO Laptop
- Internet

Learning Objectives

By the end of the lesson, learners should be able to:

Knowledge and understanding

Identify and name carpentry tools

Skills

Observe and identify carpentry tools.

Attitudes and Values

Show concern to the importance of carpentry tools

Learning/Teaching Methods

- Question and answer
- Discussion
- Observation

Learning/Teaching Materials

- Real tools
- Charts
- Flash cards
- XO laptops

Learning Activity

Observe and identify carpentry tools.

Lesson Preparation

- Find out from learners the carpentry tools available in learners' homes before the lesson.
- Collect commodity available carpentry tools and take them to the classroom beforehand.
- Identify cutting tools such as an axe, hand saw, bow saw and table saw.
- Familiarise yourself with tools such as jointer, spokes shave and spirit level.

Learning/Teaching Steps

- Ask learners to mention the carpentry tools they have in their homes.
- Ask learners to observe the pictures in the introduction of their Pupil's Book page 2.
- Allow them to discuss and describe the pictures. From their description let them predict what they are going to learn in the unit.

- (iv) Display available tools for the learners to observe and identify.
- (v) Observe charts and flash cards with pictures of tools that are not available in class.
- (vi) Let them name tools displayed.
- (vii) Ask learners to observe tools in Activity 1.1. Allow them to draw and identify all the carpentry tools.
- (viii) Let learners research more about carpentry tools in their XO laptops.

Assessment

- Listen to learners' discussion as they discuss introductory pictures as well as predict what they are going to learn in the unit.
- Mark learners' pictures.
- Assess their ability to identify tools displayed and those in Activity 1.1.
- Use the information gathered to prepare remedial lessons for learners who have difficulties in identifying tools.
- Give further practice to fast learners let them identify other carpentry tools not highlighted in table 1.1.

Teachers Notes

- Research from carpentry books to identify various types of saws and planes.
- Have adequate pictures to cover all required tools.
- The carpentry tools in Activity 1.1 are as follows:

(a) Hammer	(b) Work bench	(c) Mallet	(d) Plane
(e) Axe	(f) Wood chisel	(g) Brace	(h) Screw driver
(i) Spirit level	(j) Bow saw	(k) Jointer	(l) Metre ruler
(m) Hand saw	(n) T-square	(o) Table saw	(p) Auger bit
(q) Spokes shave	(r) Tape measure	(s) Shaper	

1.2: Usage and Maintenance of some Carpentry Tools

Number of periods: 2

Reference:

- Pupil's Book page 4
- Relevant Textbooks
- XO Laptop
- Internet
- Magazines

Learning Objectives

By the end of the lesson, learners should be able to:

Knowledge and understanding

Explain use and maintenance of carpentry tools.

Skills

- Use carpentry tools correctly.
- Maintain carpentry tools.

Attitudes and Values

- Show concern to replacing the worn out parts of carpentry tools.

Learning/Teaching Methods

- Question and answer
- Observation
- Demonstration
- Discussion

Learning/Teaching Materials

- Real tools
- Flash cards
- Charts
- XO laptops

Learning Activity

Use and maintenance of carpentry tools.

Lesson Preparation

Visit a local workshop. Organise with the carpenter to help you teach learners on how to use and maintain carpentry tools.

Learning/Teaching Steps

- (i) Take learners to a nearby carpentry workshop.
- (ii) Ask learners to name the various carpentry tools available in the workshop.
- (iii) Let the carpenter demonstrate to learners how each tool is used and maintained. Let him/her also point out safety measures to be taken when using them.
- (iv) Allow learners to use and maintain the tools as outlined in the Pupil's Book pages 4 – 10.
- (v) Let the learners take short notes on use and maintenance of the tools.
- (vi) Display flash cards and charts showing tools being maintained.

Assessments

Assess learners' ability to use and maintain carpentry tools. Use the information gathered to prepare remedial lessons for weak learners and give further practice to fast learners.

Teachers Notes

- Some of the maintenance practices are as follows:
 - (a) Sharpening
 - (b) Oiling
 - (c) Proper usage
- Proper storage
- All tools should be properly used and stored to avoid damage, accidents or theft.

- Metallic parts needs oiling to prevent rusting.

1.3: Dangers of Carpentry Tools and Security Measures

Number of periods: 2

Reference:

- Pupil's Book page 11.
- Other Relevant Textbooks in Carpentry
- Internet

Learning Objectives

By the end of the lesson, learners should be to:

Knowledge and understanding

Outline dangers of carpentry tools and precautions they should take.

Skills

Take precautions when using carpentry tools.

Attitudes and values

Show familiarity in using carpentry tools.

Learning/Teaching Methods

- Discussion
- Demonstration
- Observation
- Question and answer

Learning/Teaching Materials

- Charts
- Pictures in pupils books

Learning Activity

Find out through questions and answers the dangers and safety measures when using carpentry tools.

Lessons Preparation

- Obtain charts showing dangers when using carpentry tools
- Learners find out from their parents the dangers of using carpentry tools.

Learning/Teaching Steps

- (i) Display charts showing dangers of some carpentry tools. Let learners also read content in their textbooks page 11.

- (ii) Lead learners into discussion on the dangers of all carpentry tools for example ask them:
 - (a) Have you ever seen a person who has been injured by a carpentry tool?
 - (b) Which tool was it?
 - (c) What could have led to the injury?
- (iii) Ask learners to describe ways by which they avoid being injured while using carpentry tools.
- (iv) Allow them to discuss most dangerous carpentry tools and how to avoid them.
- (v) Let learners write other dangers posed by use of carpentry tools.

Assessment

- Ask learners questions to know if they can describe dangers of carpentry tools and ways of avoiding them. Give remedial questions to weak learners.
- Listen to learners as they make presentations on the dangers of carpentry tools. Pay attention to ways by which they avoid being injured while using carpentry tools.

(a) Remedial Activity

These are given to learners who have difficulties in naming carpentry tools. Using carpentry tools and identifying dangers of carpentry tools.

To assist these learners

- (a) Give them multiple choice questions on identification of tools.
- (b) Allow them to carefully use and maintain carpentry tools longer than other learners. In addition give them matching questions e.g. match a tool to its uses.

Example of questions

- (i) Observe pictures on page 2 and 3 and draw (a) bow saw (b) hand saw (c) axe.
- (ii) Demonstrate how to use the following tools:
 - (a) T-square (b) Wood saw (c) Spirit level
- (iii) Match the following tools with their possible dangers

Tool	Danger
(a) Chisel	(i) Can chop off your hand or fingers.
(b) Clamp	(ii) Can bore into your hand.
(c) Shaper	(iii) Can trap your fingers or hand.

(b) Consolidated Activities

Give multiple choice questions and structured questions on identification, safe use and maintenance of carpentry tools.

These questions should include safety measures during use of tools, dangers of most dangerous carpentry tools and how to avoid these dangers.

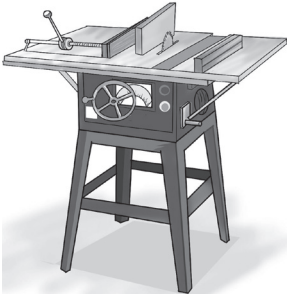
Example of questions

- (i) Identify 4 cutting and 2 drilling carpentry tools.
- (ii) Write down the maintenance practices of the following tools:
 - (a) Plane
 - (b) Axe
 - (c) screw driver
- (iii) Explain the dangers of the following carpentry tools:
 - (a) Table saw
 - (b) clamp/jointer
 - (c) Chisel
 - (d) Shaper
- (iv) Outline 2 safety measures that one can apply to prevent dangers on carpentry tools.

(c) Extension Activity

Give questions that will give learners more practise. These questions should be additional to what the learners are currently doing.

During identification of tools let fast learners propose possible uses of tools as well:

Tool	Uses
 <p>Name _____</p>	<ul style="list-style-type: none">(i) _____(ii) _____

During use of tools, allow fast learners to use other tools other than those mentioned e.g. use of mallet, wood chisel.

Give questions requiring learners to identify several ways of maintaining tools as well as avoiding dangers of the tools.

Example of questions

- (i) Group carpentry tools as:
 - (a) Cutting tools
 - (b) Smoothing tools
 - (c) Gripping tools
 - (d) Boring/drilling tools
- (ii) A girl wanted to make a chair. Suggest at least 3 carpentry tools she must have.
- (iii) Identify the uses of tools in (b) above.

Answers to Practise Activity 1.1

- (a) Screw driver (b) T-square (c) Hand saw
- (a) Jack plane (b) Claw hammer (c) Brace (d) Bow saw
- Sharpen blunt cutting edges.
 - Replace broken handles.
 - Clean the blade after use.
- To prevent rusting.
- A T-square

Possible Answers for Revision Activity 1

Number of periods: 2

Reference: Pupil's Book page 13

- Blade
- Wood saw. • Axe. • Bow saw. • Table saw

3.

A. Tools	B. Uses
(a) Saw	Driving screws into wood
(b) Plane	Cutting wood
(c) Metre	Holding pieces of wood together
(d) Clamp	Measuring the length of wood
(e) Screw driver	Smoothing wood

- Observe learners' activities. Ensure they hold the tools correctly. They use the tools correctly. They use the tools for the right purpose and avoid getting hurt/ injured while using the tools.
- (a) (i) (b) (i)
 - Sharpen the cutting edge.
 - Fix a lose or broken handle.
 - Clean the saw after use and store it safely.
- (a) Spirit level
 - (b) It is used to check if the surface is vertical or horizontal.
 - (c) Clean it with a damp piece of cloth to remove dirt. Avoid dropping it as it can break easily.
- (a) A jack plane is used to smoothen wood.
 - (b) A sand paper, scrub plane or smoothing plane.

- (c) • Clean the parts to remove dust.
 - Apply oil on the lower metallic surface to prevent rusting.
 - Sharpen the smoothing edge.
- 8. (a) A wood bench – This is a strong table on which a carpenter works.
- (b) Smoothing wood, cutting wood, making joints.
- (c) • The work bench should be firm and strong to avoid shaking.
 - Remove tools not in use from the work bench.
 - Wipe the work bench regularly. Use a brush to clean the work bench but not your bare hands.
- 9. (a) • Circular blade • Wooden frame
 - Electric motor
- (b) • It can cut parts of the body such as fingers or hands.
 - It can throw back pieces of wood that hit the user.
- (c) • Observe maximum caution while using a bench saw.
 - Place a narrow piece of metal around the cutting blade.
 - Always wear protective gear such as helmet, goggles and gloves.
 - The piece of wood being cut should be held firmly and securely.
- 10. (a) A table saw is made up of circular saw moved by electric motor. A hand saw has a wide blade and handle that the user moves it along wood.
- (b) A bow saw is made up of a frame and a narrow cutting blade. A wood saw has a wide blade and handle.
- 11. (a) They include a work bench shaper, clamp/jointer, table saw, spokeshave, plane, auger bit.
(and another appropriate answer).

(b)

Tools	Maintenance practices
Shaper	• Sharpening, oiling, fastening loose parts
Clamp	• Remove dirt, oil movable parts
Table saw	• Sharpening and oiling the blade
Work bench	• Fasten loose nuts at the handle • Remove all tools not in use and wipe it
Spokeshave	• Sharpening and proper storage

- (c) General safety measures to observe when using carpentry tools:
 - Tools should be used for their right purpose.
 - Repair all broken parts.
 - Avoid placing tools where they cannot be seen. Put the tools in the tool rack after use.

- Avoid running in the workshop.
- Always wear the necessary protective clothing when working
(other appropriate answers)

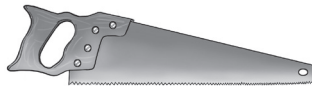
Answers to Remedial, Consolidation and Extension Activities

(a) Remedial Activity

(i) (a)



(b)



(c)



(ii) Observe learners' activities, award marks for correct demonstration.

- (iii) a – (ii)
b – (iii)
c – (i)

(b) Consolidation Activity

- (i) • Cutting tools – Bow saw, hand saw, axe, table saw, shaper
• Drilling tools – Chisel, brace

(ii)

(a) Plane	(b) Axe	(c) Screw driver
<ul style="list-style-type: none"> • Oil metallic parts. • Sharpen the blade. • Replace broken blades. • Replace broken handles. 	<ul style="list-style-type: none"> • Sharpen blunt cutting edges. • Replace broken handles. • Clean the blade after use. 	<ul style="list-style-type: none"> • Replace broken or worn out handles.

(iii) (a) Table saw

- The rotating blade can slice off the users hand or fingers.
- The table saw might throw back pieces of wood and hit the user (kickback).

(b) Clamp / Jointer

- The user can accidentally press his/her fingers or arms.
- Loosely cramped parts can break and fall or drop out on user's hands or legs.

(c) Chisel


- The sharp cutting edge of the chisel can bore into your hands if carelessly handled.
- The mallet can injure your arm or fingers while hitting the chisel head if carelessly handled.

(d) Sharper

- The blades of the sharper can cause serious injuries to the user's arm if carelessly handled.

- (iv) • Do not put your arm or fingers close to the cutting blade of tools.
- Always wear appropriate protective clothing where necessary before using tools e.g. helmets, goggles, gloves etc.

(c) Extension Activity

Tool	Uses
<p>(i)</p>  <p>Name: Claw Hammer</p>	<ul style="list-style-type: none">• Drive in Nails• Remove nails from wood.

- Assess how the learners are using the tools and award marks accordingly.

Examples of questions

- (i) (a) Cutting tools: Bow saw, table saw, wood saw, axe
(b) Smoothing tools: Plane
(c) Gripping tools: clamp / jointer
(d) Boring/drilling tools: Chisel, brace
- (ii) Carpentry tools used to make a chair: Plane, hammer, hand saw, T-square, chisel.
- (iii) Used for smoothing wood so as to give smooth and shiny surface.

Topic Area: Tools and Objects Production

UNIT 2 : MASONRY TOOLS

Number of periods: 6

Key Unit Competency

By the end of this unit the learner should be able to use and maintain masonry tools.

Background Information

- Masonry tools are tools used in the construction of farm structures and building.
- These tools needs to be taken care of to last longer.

Learning objectives

Knowledge and understanding

- Identify the common used masonry tools.
- Explain the uses of masonry tools.
- Describe the dangers of masonry tools and how to prevent them.

Skills

- Maintain masonry tools.
- Handle properly various masonry tools.

Attitude and values

- Show the an understanding of the importance of masonry work.
- Show the need to replacing the worn out parts of masonry tools.
- Show familiarly in using the masonry tools.

Summary Table of Lessons

Lesson	Content	Learner's Activities
1 Common masonry tools	Identifying common masonry tools	<ul style="list-style-type: none">• Identifying masonry tools• Observing various masonry tools.• Grouping masonry tools according to their use.
2 Use of masonry tools	Maintenance of masonry tools	Using masonry tools.

Lesson	Content	Learner's Activities
3 Maintenance of masonry tools	Usage of masonry tools.	<ul style="list-style-type: none"> • Caring and maintaining masonry tools. • Proper storage of masonry tools.
4 Dangers of Masonry tools	<ul style="list-style-type: none"> • Dangers of masonry tools. • Measures against dangers of masonry tools. 	<ul style="list-style-type: none"> • Identifying dangerous masonry tools. • Identifying ways in which masonry tools can be misused. • Avoiding dangers posed by use of masonry tools.
5 Evaluation	Revision Activity 2	Answers theory questions in the Revision Activity 2.
6 Evaluation	Revision Activity 2	Answers practical questions in the Revision Activity 2.

Cross Cutting Issues

1. Financial Education

Learners to acquire knowledge on the maintenance of masonry tools. The teacher should enlighten the learners that there is need to take care of the masonry tools because they are expensive.

Looking after tools means you can save money which can be spent on other things.

2. Inclusive Education

Learners of all abilities should be involved in various learning activities.

The learners with disabilities should be included in group activities.

Learners with physical challenges should be assigned the activities that they can handle.

Notes to the teacher

Masonry tools are of great importance to society.

When teaching about masonry tools, let learners talk about when they used masonry tools or saw them being used, or read about them.

Learners should value the tools in relation to their use and cost.

Make the lesson interesting by exposing learners to real tools showing them photographs of the tools using by using some of the tools and carrying out maintenance practices of some tools.

2.1: Identification of Masonry Tools

Number of periods: 1

References:

- Pupil's Book page 16.
- Internet
- Relevant textbooks
- XO laptop
- Magazines

Learning Objectives

By the end of the lesson, learners should be able to

Knowledge and understanding

Identify the commonly used masonry tools.

Skills

Draw masonry tools.

Attitudes and Values

Appreciate the need to have the masonry tools.

Learning/Teaching Methods

- Question and answer
- Manipulation
- Observation
- Discussion

Learning/Teaching Materials

- Masonry tools such as water level, trowel, plumb line, float, metre ruler, tape measure, jointer, among others.
- Charts showing masonry tools, pictures in books, flash cards and boards.

Learning Activity

Identify common masonry tools.

Lesson Preparation

1. Ask learners to find out names of various tools that a mason uses.
2. Collect the required learning resources and taking take them to class.

Learning/Teaching Steps

- (i) Ask learners to observe introduction pictures.
- (ii) Allow them to talk about the pictures in order for them to predict what they are going to learn in the unit.
- (iii) Display masonry tools such as water level, trowel, plumb line, float, tape measure, metre ruler, T-square, and shovel. Ask the learners to write the names of the tools they know in their notebooks. If you do not have real tools, show them charts and books with pictures of masonry tools.

- (iv) Let learners copy and fill names of tools in Activity 2.1.
- (v) Let the learners exchange their books to see each others responses.
- (vi) Allow them to present in groups in order for them to identify all the tools displayed and those in their textbook page 17.
- (vii) Ask the learners to draw three tools they have seen or used.

Assessments

- Listen to learners as they name tools.
- Evaluate if they know the correct names of tools.
- Mark the tools drawn.

Masonry tools to be identified in activity 2.1.

- | | | |
|--------------------|------------------|------------------|
| (a) Water level | (b) Trowel | (c) Plumblin |
| (d) Metre ruler | (e) Tape measure | (f) Jointer |
| (g) Wheel barrow | (h) T-square | (i) Shovel |
| (j) Masonry hammer | (k) Brick frame | (l) Chisel |
| (m) Steel float | (n) Hoe | (o) Mortar mixer |

2.2: Usage and Maintenance of some Masonry Tools

Number of periods: 2

References:

- Pupil's Book page 18
- Internet
- Magazines
- Relevant textbooks
- XO laptop

Learning Objectives

By the end of the lesson, learners should be able to use and maintain masonry tools well.

Skills

- Proper handling of masonry tools.
- Proper maintenance of masonry tools.

Attitudes and Values

- Co-operation
- Responsibility
- Curiosity

Learning/Teaching Methods

- Field visit
- Question and answers
- Observation
- Manipulating
- Group discussion

Learning/Teaching Materials

- A construction site
- Paper
- Pen
- Textbook

Learning Activity

- A visit to a construction site to observe the use and maintenance of masonry tools.

Lessons Preparation

1. Help learners to prepare materials for recording information.
2. Obtain permission from the school and construction site you are to visit.
3. Visit the construction site to ensure they have necessary tools.

Learning/Teaching Steps

- (i) Organise the learners into manageable groups and visit a nearby construction site.
- (ii) Let learners observe how various masonry tools are being used.
- (iii) Let learners use and maintain some of the masonry tools. Remind them to be careful in order to avoid dangers of masonry tools.
- (iv) When you go back to school, ask learners to discuss write a report about:
 - (a) The tools they saw.
 - (b) How the tools were being used.
 - (c) How the tools were being maintained.

Assessment

- Observe how learners handle tools. Ensure they take caution while using the tools.
- Award marks for their ability to use tools safely and correctly.

2.3: Dangers of Masonry Tools

Number of periods: 1

References:

- Pupil's Book page 22
- Internet
- Magazines
- Relevant textbooks
- XO laptop

Learning Objectives

By the end of the lesson, the learners should be able to handle masonry tools properly in order to prevent their dangers.

Skills

Apply techniques of maintaining masonry tools.

Attitudes and Values

- Co-operation
- Responsibility
- Concern
- Care

Learning/Teaching Methods

- Dramatisation
- Demonstration
- Observation
- Discussion

Learning/Teaching Materials

- Real masonry tools such as a wheelbarrow, water level, metre ruler.
- Pupil's Book.

Learning Activity

- Use and care of masonry tools.

Lesson Preparation

Ask learners to research safety measures whilst using masonry tools.

Learning and teaching steps

- Ask learners to describe how they used masonry tools when they visited the construction site. Let the learners tell you if they have ever misused tools and got injured.
- Guide the learners into a discussion on dangers of masonry tools by asking questions. For example:
 - Have you ever hurt yourself while using a masonry tool?
 - Have you ever hurt another person while using a masonry tool?
 - Have you ever damaged a masonry tool by using it in the wrong way?
- Ask the learners to suggest and demonstrate several ways of using tools safely.

Assessment

Encourage all the learners to participate.

Listen to the pupils presentations and assess whether:

- They can use masonry tools safely.
- They can describe dangers of masonry tools and how to prevent them.

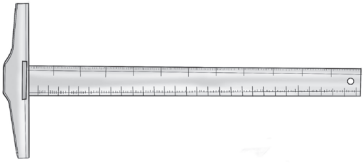
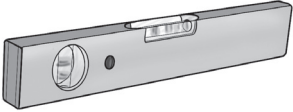
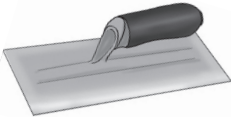

(a) Remedial Activity

- Design activities that help learners associate or match pictures of tools with their correct names.
- Allow learners to use masonry tools for a longer period ask them to say the uses aloud.

- Let learners practise safe use of the tools. Allow them to mention possible dangers of masonry tools and how to avoid them.

Example of questions

(i) Match the tools shown below to their correct names.

Tool	Name
a) 	(i) Float
b) 	(ii) Metre ruler
c) 	(iii) T-square
d) 	(iv) Water level

(ii) Describe briefly how the following tools are used:

- (a) Tape measure (b) Trowel (c) Plumb line (d) T-square

(iii) You can get _____ if you use masonry tools carelessly. (injured, healthy)

(iv) We can prevent dangers of masonry tools by

- (a) _____ (b) _____ (c) _____

(b) Consolidation Activity

- Give activities that help learners to identify commonly used masonry tools. Allow them to draw and name at least 10 tools.
- Ask learners to use all recommended masonry tools. Allocate them normal time let them discuss in groups after using the tools for them to create their own notes.

Tool	Uses

- Let learners highlight dangers of masonry tools and ways of avoiding them.

Example of questions

- Learners to sit in their working groups and draw 4 masonry tools that you have learnt.
- What will happen if we don't clean and oil metallic frames of a brick frame?
- Describe briefly how to maintain a jointer.
- Outline dangers of masonry tools:
- What will happen if we don't store masonry tools properly?

(c) Extension Activity

- Allow learners to draw, name and give possible uses of identified tools. Let them give uses and maintenance of other not covered.

Example of questions

- A farmer wants to build a poultry house. Which tools is he/she likely to use?
- Write a short comprehension describing *dangers of masonry tools* and how to prevent them.

Possible Answers for Revision Activity 2

Number of periods: 2

Reference: Pupil's Book page 23

- | | | |
|-----------------|-----------------|----------------|
| (a) Trowel | (b) Claw hammer | (c) Plumb line |
| (d) Water level | (e) Metre ruler | (f) T-square |
- It is used for mixing, scooping and applying mortar.
 - Steel float is used for plastering walls and floors.
 - Wooden float is used for spreading concrete over floors and walls.
 - It is used to measure the heights of locations that are far apart on a surface.
 - It is used to determine whether walls of a building under construction are vertical.
- Wheelbarrow
 - and (c) Observe learners activities. Award marks for proper use and maintenance of tools.
- Tighten the belts and pulleys
 - Oil the metallic parts
 - Clean it after use and store in a dry place.
 - Clean after use. Dry it using a rag. Store in a dry place.
- Observe learners activities and award marks appropriately.

6.
 - Some masonry tools can hurt if handle carelessly.
 - If not stored properly, one can trip on them and fall.
 - They can pierce the skin if stepped on.
 - Some tools can bruise when you rub against them.
7. They are important because they make construction of farm structures and buildings easier. For example, wheelbarrows help to carry sand, gravel and stones instead of carrying them by hands. Mortar mixers help in mixing cement, sand and gravel.
8.
 - (a) It is used to mix cement, sand, gravel and water to form concrete.
 - (b)
 - (i) Trowel
 - (ii) Used for mixing, scooping and applying mortar.
 - (c) Tightening belts and pulleys, oiling the moving parts and cleaning after use.
9.
 - (a) • Trowel • Wheelbarrow • Shovel
 - (b) Mortar mixer
10.
 - (a) Replace worn out parts and store the hammer in a dry and safe place after use.
 - (b) It will rot due to presence of moisture.
11.
 - (a) It is used to determine whether walls of a building under construction are vertical.
 - (b) Tape measure
 - (c) Used to measure the heights of locations that are far apart on a surface.

Answers to Remedial, Consolidation and Extension Activities

(a) Remedial Activity

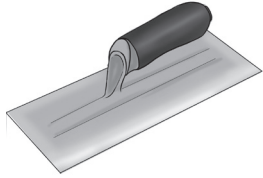

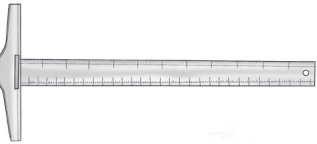

- (i) Matching

(a) – (iii)	(b) – (iv)
(c) – (i)	(d) – (ii)
- (ii)
 - (a) Tape measure – used for measuring distances, both vertically and horizontally.
 - (b) Trowel – Used for mixing, scooping and applying mortar.
 - (c) Plumb line – to determine whether walls of buildings under construction are vertical.
 - (d) T-square – Used for measuring the right angle.
- (iii) Injured
- (iv)
 - (a) Using the tools carefully.

- (b) Storing the tools in a tool rack.
- (c) Using the right tool for the right work.

(b) Consolidation Activity

(i)

 <p style="text-align: center;">Float</p>	 <p style="text-align: center;">Metre ruler</p>
 <p style="text-align: center;">T-square</p>	 <p style="text-align: center;">Plumb line</p>

- (ii) It will rust.
- (iii) Ensure the nuts of a jointer are tight.
Clean, dry and store in a dry place.
- (iv)
 - They can bruise you
 - You can trip on them and fall
 - Can cut you
 - Can pierce the skin.
- (v) One can trip on them and fall.
- (c) Extension Activities
 - (i) • Wheelbarrow • Tape measure • Plumb line • Water level
 - (ii) They can cut we should handle them carefully. Masonry tools can bruise. We should avoid rubbing against them. They can pierce the skin. We should avoid stepping on them. If not stored properly we can trip on them and fall.

Topic Area: Tools and Objects Production

UNIT 3 : OBJECTS PRODUCTION

Number of periods: 14

Key Unit Competency

By the end of this unit the learners should know how to make and maintain simple utility objects, toys and learning materials.

Background Information

Making objects promotes creativity and critical thinking. Creativity is an important aspect in promoting innovations. Objects creatively made can be sold for use in homes or schools. Object making can therefore be a source of livelihood for citizens.

Learning Objectives

1. Knowledge and understanding

- Identify the most common local material used in making utility objects.
- Explain the techniques used in making each type of object based on the materials.
- Explain the maintenance of toys, utility objects and learning, objects produced.

2. Skills

- Make toys, utility objects and learning materials using sorghum straws, sticks, wood and paper.
- Display dexterity for safety of utility objects and learning materials.

3. Attitudes and Values

- Be aware of learning from mistakes.
- Appreciate well-made play, utility and learning materials.
- Keep toys, utility and learning objects safely.

Summary Table of Lessons

Lesson	Content	Learner's Activities
1 Introduction to objects production	Introduction to objects production	<ul style="list-style-type: none">• Identify the toys they have at home or in school.• Identify the materials that can be used to make toys.

Lesson	Content	Learner's Activities
2 Making a toy house	Making a toy house using sorghum straws and sticks.	Collecting sticks and straws.
2 Making a toy house	Making a toy house using sorghum straws and sticks.	Making a toy house with straws and sticks.
4 Making a toy bicycle	Making a toy bicycle using sticks.	Collect the necessary materials such as sticks and strings.
5 Making a toy bicycle	Making a toy bicycle using stings.	Making a toy bicycle in sticks and strings.
6 Making a wooden spoon	Making a spoon in wood.	Identify and collect suitable type of wood for this purpose.
7 Making a wooden spoon	Making a spoon in wood.	Making the wooden spoon by shaping it, scooping the extra parts of wood to the desired shape.
8 Making a wooden spoon	Making a spoon in wood.	Smoothing the wooden spoon using sand paper.
9 Making a wooden hoe handle	Making a hoe handle in wood.	Identify a suitable type of wood for this purpose.
10 Making a wooden hoe handle	Making a hoe handle in wood.	Making a wooden hoe handle from wood.
11 Making learning materials	Making rhombus using manila paper.	<ul style="list-style-type: none"> Identifying the suitable materials required to make learning materials. Making rhombus.
12 Making learning materials	Making parallelogram using manila paper.	Making parallelogram.
	Making trapezium using manila paper.	Making trapezium.
13 Evaluation	Revision Activity 3	Answering theory questions in Revision Activity 3

14 Evaluation	Revision Activity 3	Answering practical questions in Revision Activity 3
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Cross-cutting issues

(i) *Environment and Sustainability*

Our environment provides us with many things: air we breathe in, water, food and even shelter and clothing. The materials needed to make toys, utility objects and learning objects are obtained from the environment. It's therefore important to emphasize the importance of conserving our environment by planting more trees and avoiding pollution.

(ii) *Financial Education*

Encourage the learners to develop an interest in making utility objects, toys and learning materials. Relate common trades they come across involving selling utility materials, the need for making them so as to earn a livelihood.

(iii) *Peace Education and Values*

Resources are becoming scarce as the population increases. It is therefore important to share what we have. Through sharing resources, there is peace and harmony. Learners should also cultivate oneness as they work in groups.

(iv) *Inclusive Education*

The teacher needs to encourage learning to participate in making objects. Remind learners that disability is not inability. They need to be given a chance to do what they can. All learners are equal and given a chance disabled children can be the best in many aspects.

(v) *Standardization Culture*

The learners should learn to appreciate quality. High quality goods last longer and eventually save money.

Notes to the teacher

Guidelines on the Project Work

- Guide the learners to collect and assemble the materials they require for the project.
- Set the timelines within which the projects should be completed.
- Give clear and precise instructions on how the objects have to be made.
- Evaluate the project by asking individuals learners to briefly describe how she or he did the project. Award learners marks for the projects.
- Encourage weak learners pairing them with high achievers.
- Encourage them to redo the work for further practice at own free time.
- Encourage learners to understand the importance of practical skills they are gaining by carrying out these projects. Encourage them to talk about points not mentioned in class.

3.1: Making toys using sorghum straws and sticks

Number of periods: 4

References

- Pupil's Book page 27, XO laptop and Relevant art and craft books.

Learning Objectives

By the end of the lesson, the learners should be able to make a toy house and toy bicycle using sticks and straws.

Skills

- Select the materials in the locality to make toys.
- Make a toy house and toy bicycle using sticks and straws.

Attitudes and Values

- Be ware of learning from their mistakes.
- Appreciate well made play and utility objects.

Learning/Teaching Methods

- Group discussion
- Practical activities
- Guided discovery
- Demonstration

Learning/Teaching Materials

- Straws and sticks, Pictures showing a house and a toy bicycle made using straws and sticks, Charts.

Learning Activities

- (a) Making a toy house using sticks and straws.
- (b) Making a toy bicycle using straws and sticks

Lesson Preparation

- Ask learner to collect straws, sticks and strings and bring them to school.
- Collect charts and pictures showing how to make toy houses and bicycles in sticks and straws.
- Select a suitable place for carrying out these activities.

(a) Making a Toy House Using straws and sticks

Learning Objectives

By the end of the lesson, the learner should be able to make a toy house.

Learning/Teaching Steps

- (i) Introduce the unit by asking learners to describe briefly the pictures on page 27 let them also predict what they are going to learn in the unit.
- (ii) Allow learners to discuss briefly in pairs what toys are.
- (iii) Display charts and pictures showing how to make a toy house.
- (iv) Also display steps outlined in Pupil's Book page 27.
- (v) Following steps in (ii) above, demonstrate to learners how to make a toy house.
- (vi) Go around assisting learners who are experiencing difficulties.
- (vii) Give learners time for them to finish their work.
- (viii) Award marks for work done.

(b) Making a Toy Bicycle

Learning Objectives

By the end of the lesson the learner should be able to make a toy bicycle

Learning/Teaching Steps

- (i) Show learners pictures of toy bicycles made in straws and sticks.
- (ii) Demonstrate how to make a toy bicycle as outlined in Pupil's Book page 28.
- (iii) Let learners practise making a toy bicycle.
- (iv) Observe learners as they work. Assist learners with difficulties.
- (v) Give them time to finish making the toy bicycles.

Assessment

1. Assess learners' ability to make toys and creativity of making both the toy bicycle and toy house using sticks.
2. Award learners marks basing on the outcome of their work.

3.2: Making Utility Objects Using Wood

Number of periods: 5

References

- Pupil's Book page 29.
- Other relevant textbooks.

Learning Objectives

By the end of the lesson, the learner should be able to make a wooden spoon and a hoe handle.

Skills

Making a wooden spoon and a hoe handle.

Attitudes and Values

- Appreciate well made utility objects.
- Show curiosity and willingness to make a wooden spoon and hoe handle.

Learning/Teaching Methods

- Practical Activities
- Exploration
- Demonstration
- Observation

Learning/Teaching Materials

- A suitable piece of wood
- A chisel
- A machete
- Saw
- Spokes shave
- Sand paper

Learning Activities

- (a) Making a spoon in wood.
- (b) Making a hoe handle in wood.

Lesson Preparation

- Ask learners to read instructions given in the Pupil's Book pages 29-30.
- Let the learners bring the outlined materials and tools.
- Select appropriate site for practical activity.

Learning/Teaching Steps

(a) Making a wooden spoon

- (i) Display pictures showing different wooden spoons. You can also display real wooden spoons.
- (ii) Ask learners to read through steps of making a wooden spoon as outlined in Pupils Book page 29.
- (iii) Demonstrate to learners how to make a wooden spoon using collected materials.
- (iv) Allow learners to make wooden spoons individually. Go round checking their activities.

(b) Making a hoe handle

- (i) Ask one learner to draw a hoe handle on the board.
- (ii) Ask learners to describe how hoe handles are made in their homes.
- (iii) Take them through the steps of making a hoe handle as outline in Pupil's Book page 30.
- (iv) Allow learners to make hoe handle following these steps.
- (v) Observe and assist learners when making the hoe handle.
- (vi) Give precautions of handling cutting or sharp tools.

Assessment

1. Observe learners' ability to make good spoons and hoe handle from wood.
2. Award marks and record their progress using RAG table.

3.3: Making Learning Materials Using Manila Paper

Number of periods: 2

References

Pupil's Book page 30.

Learning Objectives

By the end of the lesson, the learner should be able to make parallelogram, rhombus and trapezium using manila paper.

Skills

- Selecting the correct materials for the activity.
- Making learning materials using manila paper.

Attitudes and Values

- Show care and responsibility by taking care of learning materials.
- Show interest and willingness to make learning materials.

Learning/Teaching Methods

- Practical activities
- Question and answer
- Exploration
- Demonstration

Learning/Teaching Materials

- Colored manila papers
- Pair of scissors and razor blade
- Ruler
- Compass
- Protractor
- Glue/cellotape
- Crayons
- Paint and brush

Learning Activity

Making shapes using manila paper.

Lesson Preparation

1. Collect manila paper and scissors.
2. Learners to read the content in the Pupil's Book pages 31 – 33.

Learning/Teaching Steps

- (i) Ask learners to draw a rhombus, a parallelogram and a trapezium in their Notebooks.

- (ii) Demonstrate to the learners how to draw rhombus, parallelogram.
- (iii) Ask learners to draw these shapes on manila papers.
- (iv) Let them follow the procedures outlined in Pupil's Book pages 30 – 32. If colored manila paper is not readily available use ordinary paper.
- (v) Caution learners on dangers of using sharp objects.
- (vi) Go round inspecting the learners work.
- (vii) Let learners paint or colour the shapes using crayons or paint to make them attractive.

Assessment

1. Assess learners knowledge on common shapes. Take note of how they use sharp objects, co-operation and communication skills.
2. Award them marks on ability to perform tasks in each outlined step.
3. Record their progress in the RAG table.

3.4: Maintenance of Utility and Learning Objects

Number of periods: 3

Reference: Pupil's Book page 33, Teacher's Guide.

Learning Objectives

By the end of the lesson, the learners should be able to:

Knowledge and skills

State ways to keep the various objects produced safely.

Skills

Keeping toys safely.

Attitudes and Values

Understand the need to keep utility and learning objects safely.

Learning/Teaching Methods

- Demonstration
- Practical activity

Learning/Teaching Materials

- Charts
- Bags
- Shelves
- Made objects
- Clipboards
- Cartons

Learning Activity

Storing toys, utility objects learning materials safely.

Lesson Preparation

- Ask the learners to write down ways of keeping objects safely at home.

- Collect the appropriate storage materials such as cartons and bags.
- Collect all required learning materials.

Learning/Teaching Steps

- Group learners into manageable groups.
- Ask learners to discuss various ways materials are kept at home.
- Let learners practise various ways of maintaining objects they have made in storage places available.
- Ask learners to discuss other ways of maintaining utility and learning objects.
- Ask the learners to write in their notebooks reasons for maintaining toys and other objects made.

Assessment

Observe learners keenly as they store the made objects.

Award marks for correct storage of objects.

(a) Remedial Activity

- Allow learners to select suitable materials for making toys.
- Give them an activity to make simple toys, utility objects or learning materials at their own pace e.g. toy bicycle, hoe handle and rhombus.
- Assign them more faster grasping peers to collaborate in Activities. For theory, give simple multiple choice questions.

Examples of Questions

- _____ and _____ are made from wood.
(Cooking stick and spade), (Cooking stick and hoe handle)
- Make a simple wooden spoon from wood.

(b) Consolidation Activity

- Ask learners to make a toy house in sticks and straws. Let them use other designs.
- Allow them to make hoe handles of various size on their own.
- Let them make rhombus and trapeziums using waste papers and manila papers.
- Allow them to store made objects appropriately.

Examples of Questions

- Make a wooden spoon.
- Store made objects in racks and sacks.
- Name 3 other places where made objects can be stored.

(c) Extension Activity

- Ask the learners to make toy bicycle with rotating wheels. Let them use coloured straws and sticks.
- Ask learners to make wooden spoons of various shapes. Let them make attractive patterns on their handles.
- Ask learner to make various shapes and colour them using crayons or paint.

Examples of Questions

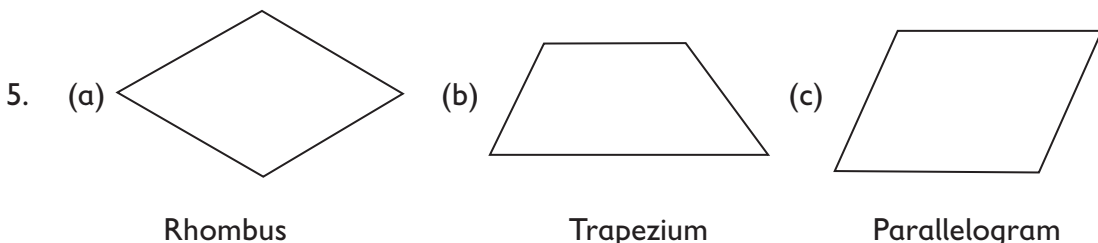
Make a wooden spoon. Colour the spoon using locally made paint (from plant leaves or flowers).

Possible Answers for Revision Activity 3

Reference: Pupil's Book page 34 – 35

Number of periods: 2

1. Observe learners activities. Award marks for creativity, good quality work and ability to finish the given task on time.
2. (a) • Observe learners as they make basic wooden hoe handles.
 - Award marks for creativity and safe use of cutting tools.
 - Supervise learners activities to minimise injuries and cheating.
3. (a) • Observe learners as they make, colour and store the trapezium made.
 - Award marks for well made trapeziums, creatively coloured trapeziums and correct storage.(b) • Machete • Saw • Spokeshave • Sandpaper
4. • A wooden spoon should be washed, dried and hung on the rack.
 - A wooden hoe handle should be kept in the store.
 - Learning materials such as trapezium, rhombus and parallelogram should be mounted on manila paper and placed on a soft board.



6. (a) • Hammer • Saw
(b) • She used the saw to cut the wood.
 - She used the hammer to drive nails in wood.
7. (a) • wood • Sticks • Strings or wires
(b) From the local environment

8. (a) Should be careful when using a machete to avoid causing injuries.
(b) Should be careful when using a hammer.
(c) Sticks should be handled carefully to avoid poking to the eyes.
9. The toy house can be covered using packing paper, grass and leaves. She can also keep her toy house on a rack or in a box.
10. (a) Used for cooking.
(b) Fitted to the hoe for digging
(c) Serving food.

Answers to Remedial, Consolidation and Extension Activities

(a) Remedial Activity

- (i) Cooking stick and hoe handle.
- (ii) For this question assess whether the cooking stick is correctly made and award marks accordingly.

(b) Consolidation Activity

For question (i) and (ii) observe whether the wooden spoon is correctly made and stored/displayed appropriately. Award marks accordingly.

(c) Extension Activity

Observe whether the wooden spoon has been correctly made and painted then award the appropriate marks.

Topic Area: ICT

UNIT 4

:

COMPUTER MY FRIEND

Number of periods: 9

Key Unit Competency

By the end of the this unit, the learner should be able to use data storage devices and share data.

Background Information

The computer system is made up of hardware components that work together for the computer to complete tasks. When computer hardware are joined together we can connect different devices and use them for communication and file sharing. Learners need to be taught the basic hardware components such as computer memory, hard drive and their roles in ensuring the effective performance of a computer system.

Learning Objectives:

1. Knowledge and Understanding

- Explain the concept of data and memory.
- Describe and define data, memory and storage.
- Explain the concept of data sharing.

2. Skills

- Differentiate and use the different types of storage and memory devices.
- Practise typing, saving and opening a document from the internal storage.
- Practise inserting and removing a flash disk/memory stick from the computer.
- Copy a document from a flash disk to a Journal/computer and vice versa.

3. Attitudes and Values

- Appreciate the use and flexibility of external storage in a computer.
- Be excited about how data can be kept on storage media.
- Communicate with others in sharing files and documents.
- Appreciate the importance of saving on storage devices.

Summary Table of Lessons

Lesson	Content	Learner's Activities
1 Data and Memory	Meaning of data	<ul style="list-style-type: none"> • Finding the meaning of data and memory from the dictionary. • Practise restarting the computer and understanding meaning of data and memory.
2 Data and Memory	<ul style="list-style-type: none"> • Meaning of memory • Roles of memory 	<ul style="list-style-type: none"> • Discussing the roles of memory. • Exercises of typing a text into a computer and practice saving the text in different locations.
3 Examples of data and memories	Hard disk	Discussing the roles of internal storage.
4 Examples of data and memories	Internal storage: ROM and RAM	Practise saving in internal storage and typing the file name for the document.
5 Examples of data and memories	External Storage <ul style="list-style-type: none"> • Memory card • Flash disk • External hard disk 	<ul style="list-style-type: none"> • Practise how to open the Journal. • Practise copying files to external storage devices from the Journal. • Practise copying files from SD-card to flash disk.
6 Sharing a Document	Send an invitation	<ul style="list-style-type: none"> • Create a collaborative project. • Practise sending invitations to friends.
7 Sharing a Document	Share with the neighbourhood	Open the shared activity to view available comments from friends.
8 Evaluation	Revision Activity 4	Answer theory questions in Revision Activity 4.
9 Evaluation	Revision Activity 4	Answer practical questions in Revision Activity 4.

Cross-cutting Issues

(a) Financial Education

Learners should understand that devices used in ICT are expensive to purchase and repair. Let them get used to a habit of taking care of them. Write down computer best practices that learners should follow when using the devices especially computers both at school and at home.

(b) Standardisation Culture

Introduce this concept to learners by relating different storage devices and their basic roles. For instance, make learners understand that computer hardware can work in the same way if given similar commands (software).

(c) Inclusive Education

Make learners understand that they are all equal regardless of their physical appearance. Let physically disabled learners participate in class activities too. Cultivate the values of care and concern among learners so that they can assist their disabled peers. Learning how to use the keyboard and touchpad will help learners integrate ICT skills in other subjects.

(d) Peace Education

Allow learners to choose their pairing friends. Also encourage them to settle their personal differences on their own. Supervise them as they share learning resources both outside and inside the classroom.

Copying data from one device to another will allow learners to share information resources through sharing, information resources will easily be available and hence improve on the use of storage devices.

Notes to the teacher

This unit requires the teacher and the learners to interact with the XO computer and Sugar activities. You should let learners know the hardware components of the XO computer before starting the lesson.

Ensure that learners observe the computer best practices at all times when using XO laptops and other computers in general. Since learners will interact more with the activities in sugar interface, give them a chance to explore and discover many of its features.

In case you do not have an XO computer remember to obtain at least one ordinary laptop or one desktop computer in your school. You can then load Sugar onto your ordinary computer. Sugar on a stick is available for download on internet.

The Sugar on a Stick (soas) can run on a Windows operating system. You can download the Sugar software from the internet and burn it to a CD. (Call on the services of an IT specialist). You can also download Sugar and save it on a USB stick. These saved applications can be run on many computers including ordinary laptops, personal computers and IMacs.

4.1: Data and Memory

Number of periods: 2

Reference: Pupil's Book page 37, Teacher's Guide, Internet and XO laptop

Learning Objectives

By the end of the lesson, the learner should be able to:

Knowledge and Understanding

- Explain the concept of data and memory
- Give examples of data and memory
- Explain the roles of memory

Skills

- Practising how to save data into memory.
- Identify and differentiate between internal and external storage devices.
- Differentiate different storage devices.
- Identify storage devices and memory.

Attitudes and Values

- Appreciate the use of storage devices.
- Understand the flexibility of external storage devices.
- Show concern for the importance of storage devices.

Learning/Teaching Methods

- Explanation
- Observation
- Collaboration
- Practical activities
- Question and answer technique

Learning/Teaching Materials

- Charts
- Board
- Projector
- XO laptops
- Desktop computers or laptops
- CDs or flash disks with sugar software

Learning Activities

- (i) Research the meaning of data and memory.
- (ii) Typing text using the XO Write Activity.

Lesson Preparation

1. The teacher should avail chats and images showing examples of data, memory and storage devices.

2. Ensure learners have enough XO laptops and the projector is setup early enough to avoid interrupting the lesson.

Teaching Steps

- (i) Instruct learners to open their Pupil's Book page 37.
- (ii) Allow them time to look at the illustrations on that page.
- (iii) Let them write what they have seen in their notebooks.
- (iv) Instruct them to exchange their exercise books with the rest of the class to see what they have written.
- (v) Introduce the topic by explaining to learners that data and memory function in the same way as the human brain functions.
- (vi) Engage learners by questioning about specific things such as:
 - (a) Who has ever heard of data?
 - (b) What is memory?
- (vii) Provide examples of data and memory types for the learners to be familiar with.
- (viii) Demonstrate how memory works using XO laptop Journal.
- (ix) Ask learners to discuss in pairs why memory is important in a computer.
- (x) Instruct learners to open any activity such as Write Activity. This will take some time to open.
- (xi) Explain to learners that the computer is loading the requested activity into computer memory. That is why it has to take few seconds.

Assessment

- Assess learners' ability to give an explanation of data and memory to fellow classmates.
- Assess learners' ability to explain clearly the role of memory.

Teacher's Notes

Wherever possible, try to have pictures or examples of data and memory types. Use Pupil's Book page 37 as reference if you don't have additional pictures.

Emphasize on the importance of learning how data and memory works in a computer. Give elaborate explanations and demonstration on how memory works. This will create interest among the learners.

4.2: Internal Storage Devices

Number of periods: 2

Reference: Pupil's Book page 38, Teacher's Guide and XO laptop.

Learning Objectives

By the end of the lesson, the learner should be able to:

Knowledge and Understanding

- Identify types of internal storage.
- Differentiate internal memory.
- Understand the functionality of internal memory.

Skills

- Practise saving and opening a document from internal storage.
- Explanation of the functions of internal storage.

Attitudes and Values

- Appreciate the way internal storage save data and information.
- Show an understanding of the link between RAM and the hard disk.

Learning/Teaching Methods

- Explanation
- Observation
- Collaboration
- Practical

Learning/Teaching Materials

- Charts
- Desktop computers
- XO laptops
- Charts and pictures showing RAM and ROM

Learning Activities

- (i) Learners to identify internal storage devices (RAM, ROM and Hard disk)
- (ii) Instruct learners to start Write activity then type the title for the activity.
- (iii) Let learners open the Journal and check the saved activities.

Learning/Teaching Steps

- (i) Display pictures showing RAM, ROM and Hard disk on the board.
- (ii) Ask learners to identify these images.
- (iii) Explain the meaning of ROM and RAM to the learners.
- (iv) Allow learners to discuss the roles of memory in pairs.
- (v) Engage learners by questioning on specific things such as:
 - (a) How does RAM helps in saving sugar activities?
 - (b) What is the Journal?
- (vi) Provide examples of scenarios where RAM is used for the learners to be familiar with.
- (vii) Demonstrate how to save activities in the Journal.
 - (a) Start Write Activity from the Home View (the Write icon looks like a piece of paper and a pencil). Type something in the work area.

- (b) On the tool bar in the activity text box, type your file name.
 - (c) This saves the document using the specified name.
- (viii) Ask learners to complete Activity 4.2, 4.5 and 4.6 on Pupil's Book. Go round checking to ensure they do the right thing.

Assessment

- Allow learners give an explanation of how internal storage work together to save data.
- Ensure learners can distinguish between memory and the hard drive.
- Ensure learners copy all notes and complete all assignments.

Teacher's Notes

Since RAM is a working memory it is always important to save your activities in a permanent storage which is inbuilt in this case the Journal. The XO laptop saves our data automatically into the Journal. Always remember to assign a file name to any document you are working on for easy retrieval when needed. Wherever possible, try to have real examples of ROM, RAM and the Hard disk. If not use pictures and videos downloaded from the internet. Also use Pupil's Book as reference if you don't have additional pictures.

Emphasize on the importance of learning how data is held in memory transferred to the hard disk for permanent storage. Give explanations and demonstration on how RAM and the Hard disk work together. This will create interest among the learners.

4.3: External Storage Devices

Number of periods: 1

Reference: Pupil's Book page 42, Teacher's Guide and XO laptop.

Learning Objectives

By the end of the lesson, the learner should be able to:

Knowledge and Understanding

- Identify types of external storage devices.
- Differentiate between different external storage device.
- Understand the functionality of external memory.

Skills

- Practice saving and opening a document from external storage.
- Practice explaining the functions of external storage.

Attitudes and Values

- Appreciate the use of external storage.

- Understand the link between the Journal and external storage.

Learning/Teaching Methods

- Explanation
- Observation
- Collaboration
- Practical activities

Learning/Teaching Materials

- Charts
- Desktop computers
- XO laptops
- External Hard disk
- Flash disks
- Micro SD cards

Learning Activities

- Create a document.
- Save the created document from the Journal to an external device.
- Instruct learners to open the Journal then copy any saved activity to external storage.
- Navigate to the external storage and confirm if the saved file is available.
- Eject the external storage device using the right procedure.

Lesson Preparation

- Avail charts, images and external storage devices showing how to save to external storage to class.
- Ensure learners have enough computers and the projector is set early enough to avoid interrupting the lesson.

Learning/Teaching Steps

- (i) Display charts showing memory card, flash disk, DVD and external hard disk on the chalk board, chart or on a projector screen.
- (ii) Ask learners to identify these external storage devices.
- (iii) Engage learners by questioning on specific things such as:
 - (a) How do external storage devices look like.
 - (b) What is their importance?
- (iv) Provide different examples of storage devices for the learners to observe and hold. Allow learners to refer to their Pupil's Book pages 42 – 43.
- (v) Demonstrate how to save files on external storage devices.
 - (a) Start Write Activity from the Home View (The Write icon looks like a piece of paper and a pencil). Type something in the work area.
 - (b) On the tool bar in the activity text box, type your file name.
 - (c) This saves the document using the specified name.
 - (d) Click on the Journal icon (it looks like a folder) to open it.

- (e) Point on a file you wish to save in an external drive then copy to the device to save.
- (vi) Instruct learners to complete Activity 4.7, 4.8 and 4.9 on Pupil's Book. Go round checking guiding them as they complete the activity.

Assessment

- Assess learners' ability to give an explanation of external storage devices.
- Let learners give examples of scenarios where external storage is used.
- Check learners notes and assignment.

Teacher's Notes

The term external storage simply means an off-site storage that is not inside the computer. Different forms of external storage exist in the market today with vast storage capacity ranging from gigabytes to multi-terabytes of storage space. If possible, display example of external storage devices to the learners. If not available use pictures and videos downloaded from the internet. Also use Pupil's Book as reference if you don't have additional pictures.

Emphasise on the importance of learning how to use external storage devices. Advantages of external storage includes portability and data sharing.

4.4: Sharing a Document

Number of periods: 2

Reference: Pupils Book page 44, Teacher's Guide, XO laptop

Learning Objectives

By the end of the lesson, the learner should be able to:

Knowledge and Understanding

- Send an invitation to a friend
- Share projects with the neighbourhood

Skills

- Practice sending invitations to friends.
- This will enhance collaboration.
- Practice sharing projects with the neighbourhood to enhance critical thinking.

Attitudes and Values

- Appreciate how sending invitations helps in collaboration.
- Understand the values of sharing files and projects.
- Acknowledge the shared activity by giving positive comments.

Teaching Methods

- Explanation
- Observation
- Collaboration
- Practical activities

Learning/Teaching Materials

- Charts
- Desktop computers
- XO laptops
- Hard Disk
- Wi-fi

Learning Activities

- Saving and opening documents.
- Sharing a document by sending an invitation.
- Sharing a document with the neighbourhood.

Lesson Preparation

- Avail chats and images showing examples of data, memory and storage devices
- Ensure learners have enough computers and the projector is setup early enough to avoid interrupting the lesson.

Teaching Steps

- Start the lesson by writing the topic “sharing a document” on the chalk board.
- Challenge learners to explain how they normally share their personal effects.
- Engage learners through questioning on specific things such as:
 - What do you need in order to collaborate effectively?
 - What are the steps you take when sending an invite?
 - What do you see when you access the neighbourhood View of XO laptop?
 - Allow learners time to read instruction showing how to send invitation and accessing the neighbourhood view.
- Apart from using the XO laptop provide examples of scenarios on how file sharing can be done.
- Demonstrate on how to share activities with the neighbourhood. Then let learners practise sharing of documents individually.
- Ask learners to complete activity 4.10 and 4.11 in their Pupil’s Book. Go round checking and encouraging learners to follow the procedure.

Assessments

Assess learners’ ability to share documents by sending invitations and by sharing with the neighbourhood.

Teacher’s Notes

Always encourage learners to share files and projects among themselves. This will expose them to higher order thinking when another person comments on a

shared project. Through sharing, learners will learn different skills on how to share information resources with the rest of the world.

(a) Remedial Activity

Give learners oral questions on definition of RAM and ROM and the roles they play in processing data. Design questions where learners can fill in the blank spaces.

Present for learners to identify memory types and mention their roles.

Give learners various real materials for them to discuss in groups about the types memory, roles of memory and how to share documents.

Give matching questions. Learners will be required to match memory type to their respective roles or match storage device to the correct description.

Example of Questions

1. Which type of memory is data saved temporarily (RAM, ROM)?
2. DVD stand for _____.
3. Match the following types of memory to the correct description.

Memory type	Description
RAM	(a) It is non-volatile
ROM	(b) Data is saved permanently
	(c) It is volatile
	(d) Data is saved temporarily

(b) Consolidation Activity

Provide learners with questions where they will be required to explain the meaning of memory, internal storage, external storage and their roles.

Give learners structured questions on the roles of computer memory, internal storage and external storage.

Example of Questions

Organise learners in groups and let them discuss and answer these questions practically on their XO laptops.

1. Explain briefly the meaning of collaboration.
2. In your own words explain the roles of the following types of memory:
 - (a) RAM
 - (b) ROM
3. Start write activity
 - (a) Create a birthday message.
 - (b) Navigate to the Journal and copy this file to a flash disc.
 - (c) When you copy the original file remains in the Journal.

- (i) Why do you think the original file remained in the Journal?
- (ii) Explain the role of memory.

(c) Extension Activity

Let learners write brief notes on the following topics: roles of computer memory, internal storage, external storage and sharing a document.

Ask learners to relate how computer memory works with storage devices in ensuring effective data management.

Give learners activities to store data in storage devices, send invitations and share with the neighborhood.

Example of Questions

1. Write short notes on the following:
 - a) Types of computer memory
 - b) Types of internal storage devices
 - c) Types of external storage devices
 - d) Roles of memory and storage devices
2. Give a description of storage devices shown in the table below.

Storage devices	Description
Hard drive	
External hard drive	
Micro SD-Card	

Possible Answers for Revision Activity 4

Reference: Pupils Book page 46

Number of periods: 2

1. (a) (i) External hard disk (ii) Internal hard disk
 (iii) ROM chip (iv) Memory card
- (b) • Internal memories - (ii) and (iii)
 • External memories - (i) and (iv)

RAM - It is a temporary memory. It loses data when power goes off suddenly.

ROM - It is a permanent memory. It does not lose data when power goes off suddenly.

2. RAM is the same as hard disc
3. The ROM loads the operating system
4. Navigate to the tool bar

5. Examples of data:
 - Numeric values such as 1,2,3 e.t.c
 - Letters of alphabets such as A, B, C, D e.t.c
 - Symbols such as #, @, / e.t.c
6. It loads stored programs.
7. It stores a large amount of data.
8. Functions of ROM:
 - (a) Starting the computer
 - (b) Loading the operating system
 - (c) Saving data permanently
9. RAM
 - Since RAM is a working memory, open programs are held temporarily.
 - RAM is volatile
10. How to save in a flash disk: (a, b, c)
 - Observe how learners insert the flash disk in the USB port.
 - Award marks for correct copying of information from the Journal to the flash disk.
11. How to share:
 - Check learners composition.
 - Assess their ability to share documents with the neighbourhood.
 - Go to the Neighborhood then click a friend's XO icon to send an invite request.
 - Once you have invited your friend, tell him or her to click the Write icon in the Frame of his or her XO computer.
 - Click on Join option from the dropdown menu that appears.

(Appropriate answers)

Answers to Remedial, Consolidation and Extension Activities

(a) Remedial Activity

1. Random Access Memory (RAM).
2. Digital Versatile Disc.
3. RAM – • It is volatile. • Data is saved temporarily.
ROM – • It is non-volatile. • Data is saved permanently.

(b) Consolidation Activity

1. Collaboration is sharing what you have with others. You can collaborate by sending or sharing with neighbourhood.

2. (a) RAM holds instructions and data needed to complete tasks temporarily.
(b) ROM holds instructions and data needed to start the computer.
3. Supervise how learners create simple table and copy the same table file to flash disc.
 - (i) The original file remained in the Journal because it is a permanent storage.
 - (ii) Memory is used to save data and instructions either permanently or semi-permanently.

(c) Extension Activity

1. (a) There are two types of computer memory namely RAM and ROM. ROM stands for Read Only Memory. This type of memory only allows reading of its content. It is also a permanent storage or non-volatile. ROM contains data that is used when starting computer, checking the RAM and loading other computer programs. RAM stands for Random Access Memory. It is temporary memory. Most computers do not store what you have worked on automatically. When power goes off suddenly, what you have been working on disappears. This is said to be volatile.
 - (b) Internal storage is any storage type found inside the computer system. This will include ROM, RAM and the hard disc.
 - (c) External storage refers to devices that are not permanently fixed on or in a computer. These devices are used to store information permanently. These devices include memory cards, flash disks, CDs, DVDs and external hard drives.
 - (d) Computer memory is important for storing information. Memory holds instructions and data needed to complete task. The Journal is the internal storage of the XO laptop. These are storage/memory found inside the computer. They include ROM, RAM and hard disk. The external storage devices are found outside the computer. They include memory cards, flash disks, CDs, DVDs and external hard drives.
2. Hard drive – A permanent storage device found inside the computer such as the Journal.

External hard drive – A permanent storage device that is used externally. It is also portable.

Micro-SD card – It is also called memory card. It is an electronic device used for storing digital information.

Topic Area: ICT

UNIT 5

:

WRITING SKILLS

Number of periods: 8

Key Unit Competency

By the end of the this unit, the learner should be able to perform Write Activity.

Background Information

The Write Activity is designed to be used for creating documents. It opens with a simple interface that allows you to quickly start writing a story, poem, or essay. You can also insert images, create tables, and change the look of the document.

In P4, we used the Write Activity to format and edit information we entered into the computer. In P5, we will use the Write Activity to teach learners how to insert tables and pictures in their document as well as deleting the tables and inserting pictures and comments.

Learning Objectives

1. Knowledge and understanding

- Distinguish between columns and rows
- Identify how to extend the length of a column and the height of row
- Identify how to increase/decrease the number of rows or columns
- State how to import/insert, resize and position a photo in the Write Activity

2. Skills

- Practice creating tables by labelling rows and columns.
- Practice inserting data into a tables.
- Edit the table by adding or deleting columns and rows in the table.
- Insert pictures/pictures and perform editing.

Attitudes and Values

- Appreciate the way tables keep data.
- Care for the number of rows and columns that make up the table.
- Appreciate the use of pictures and images in Write Activity.

Summary Table of Lessons

Lesson	Content	Learner's Activities
1 Create tables	Insert table, columns, rows.	<ul style="list-style-type: none"> • Finding the meaning of rows, columns, and cell from the dictionary. • Individual activity on creating tables.
2 Create tables	Delete column, row, table.	Individual activity on deleting columns and rows.
3 Create tables	<ul style="list-style-type: none"> • Add columns and rows. • Enter text in table. 	<ul style="list-style-type: none"> • Practise using table tools such as delete, insert, format etc. • Practise entering text in a table. • Practise resizing rows and columns.
4 Insert pictures and images	Insert pictures and images.	<ul style="list-style-type: none"> • Practise inserting pictures in a text. • Practise inserting images from external devices such as flash disk and Micro SD card.
5 Insert pictures and images	Resize and position pictures and images.	Practise resizing images.
6 Insert pictures and images	Adding comments on images	Practise adding comments to images.
7 Evaluation	Revision Activity 5	Answering theory questions in Revision Activity 5.
8 Evaluation	Revision Activity 5	Answering practical questions in Revision Activity 5.

Cross-cutting issues

(i) *Financial education*

Learners should understand that devices used in ICT are expensive to purchase and repair. Let them cultivate a habit of taking care of them as they learn how to work with tables. Write down computer best practices that learners should follow when handling their devices.

(ii) *Standardization culture*

The Write Activity uses almost the same features found in any other word processor application. The teacher should clarify this by giving other examples of word processors available on the market.

(iii) Inclusive education

Make learners understand that they are all equal regardless of their physical appearance. Let physically disabled learners be involved in creating tables.

Cultivate the values of care and concern among learners so that they can assist their disabled peers in manipulating tables.

(iv) Peace education

Allow learners to choose their pairing friends when giving group activities. Also encourage them to settle their personal differences on their own. Supervise them as they share their XO laptops and other learning materials.

Notes to the Teacher

This unit requires the teacher and the learners to interact with Write activity. Encourage learners to explore more on how to use the table tool bar. Ensure learners observe the computer best practices at all times when using XO laptops and other computers in general.

In case the XO computer is not available remember to obtain at least one ordinary laptop or desktop computer in your school and use sugar on a stick.

A table is a grid of cells arranged in rows and columns. You can create tables in Write Activity.

5.1: Create Tables

Number of periods: 3

Reference: Pupil's Book page 50, Teacher's Guide and XO laptop.

Learning Objectives

By the end of the lesson, the learner should be able to:

Knowledge and Understanding

Distinguish between rows and columns.

Skills

- Insert a table in Write Activity
- Create a table by labelling rows and columns.
- Insert data in cells.
- Adjust rows and columns.
- Delete rows and column.

Attitudes and Values

- Appreciate the way tables keep data.
- Care for the number of rows and columns that make up a table.

Learning/Teaching Methods

- Explanation
- Observation
- Discussion
- Collaboration
- Practical
- Pair and share

Learning/Teaching Materials

- XO computer
- Desktops
- Laptops
- Sugar on a disk
- Projector

(a) Creating Tables

Learning Activities

- (i) Drawing tables in the Write Activity.
- (ii) Typing text in tables.

Lesson Preparation

- Avail chats and images showing examples of different table templates.
- Ensure learners have enough XO laptops or sugar on a disk and the projector is setup early enough to avoid interrupting the lesson.

Teaching Steps

- (i) Give a brief overview of the topic relating it with Computer My Friend.
- (ii) Display charts showing different table templates for learners to be familiar with tables.
- (iii) Engage learners through questioning:
 - (a) What are rows and columns in a table?
 - (b) What kind of information can be inserted in a table?
- (iv) Demonstrate how to insert a table in the Write Activity
- (v) Demonstrate how to type text in a cell.
- (vi) Ask learners to complete Activity 5.1 found in their Pupil's Book. Go round checking to ensure the right procedure is used.

Assessments

- Allow learners to practice on effective use of table tool bar in creating a table.
- Practice exercise on entering text in table cells.
- Counter check their laptops or desktops to evaluate their progress.

(b) Inserting Columns and rows

Learning Activity

Using the table tool to insert columns and rows.

Teaching Steps

- (i) Start the lesson with a recap of previous lesson.

- (ii) Ask learners to start Write Activity and access the table tools. Let them insert a table with two columns and two rows.
- (iii) Engage learners in the lesson by them to practise inserting more rows and columns in the table they had created earlier.
- (iv) Demonstrate how to insert columns and rows in an existing table.
- (v) Ask learners to complete exercise 5.2 found in their Pupil's Book. Go round checking to ensure they are doing the correct thing.

Assessments

- Assess learners' ability to insert columns and rows in an existing table.
- Practice exercises on inserting columns and rows.

(c) Extending Column and row heights

Learning Activity

Adjusting columns and rows.

Lesson Preparation

- Avail chats and images showing examples of different table templates.
- Ensure learners have enough XO laptops or sugar in a disk and the projector is setup early enough to avoid interrupting the lesson.

Teaching Steps

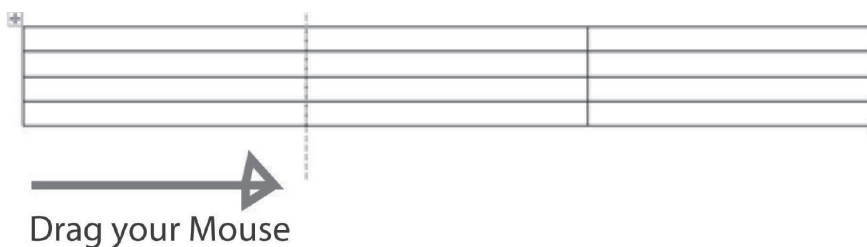
- (i) Start with a recap of previous lesson. Explain to the learners that in this lesson they will learn how to resize rows and columns.
- (ii) Engage learners through questioning:
 - (a) What do you do if a typed word does not fit in a cell?
 - (b) What does resize mean?
 - (c) How do we resize columns and rows?
- (iii) Demonstrate how to resize columns and rows.
- (iv) Allow learners to practise resizing rows and columns in their tables.

Assessment

- Assess learners' ability to resize rows and columns.
- Give them activities that will enable them practise resizing of columns and rows.

Teacher's Notes

To resize columns and rows, you must be comfortable using the touch pad or mouse. Point to the margin of the column or row to be resized. You will see a double pointed arrow. Hold down the left button of your touch pad as you drag the mouse.



Ensure learners use the right procedure to resize columns and rows. Keep on demonstrating how they can resize to ensure a pleasant presentation of text in a table.

(d) Deleting Columns and rows

Learning Activities

Deleting columns and rows from tables.

Teaching Steps

- (i) Engage learners through questioning:
 - (a) What does delete mean?
 - (b) How do you delete a column?
- (ii) Demonstrate on how to delete columns and rows.
- (iii) Let learners practise how to delete rows and columns.
- (iv) Demonstrate how to delete a table. Allow learners to practise inserting and deleting tables.

Assessments

- Give learners exercises on the effective use of table tool to delete columns and rows.
- Check their laptops or desktops to evaluate their progress on deleting column and rows.

Teacher's Notes

To delete select row or column then on the table tools menu choose the right option to delete. You can also place the cursor in the row or column you want to delete then select appropriate command to delete. Ensure learners use the right procedure to delete columns and rows. Keep on demonstrating on how they can delete multiple columns or rows to save time.

5.2: Insert Pictures and Images

Number of periods: 3

Reference: Pupil's Book page 54, Teacher's Guide and XO laptop.

Learning Objectives

By the end of the lesson, the learner should be able to:

Knowledge and Understanding

- Discover how to insert pictures and images.
- Learn how to resize pictures and images.
- Learn how to type comments on images.
- Delete unwanted images.

Skills

- Insert pictures and images from internal and external storage.
- Manipulate pictures and images by resizing.
- Effectively move and delete pictures and images.

Attitudes and Values

- Appreciate the use of pictures and images in the Write Activity.
- Show concern and care when resizing pictures and images.

Teaching Methods

- Explanation
- Demonstration
- Collaboration
- Practical
- Pair and share

Learning/Teaching Materials

- XO computer
- Desktops
- Laptops
- Sugar on a disk
- Projector

(a) Insert Pictures and Images

Learning Activities

- (i) Taking photographs using the XO laptop.
- (ii) Drawing pictures in the Paint Activity.

Lesson Preparation

Avail chats showing steps to follow when inserting pictures/ images. Ask learner to read content from the Pupil's Book page 54.

Teaching Steps

- (i) Use guided discovery to help learners know how images are inserted in Write Activity. Observe closely to see how they try to discover on their own.
- (ii) Encourage learners to speak about the task and compare what they have done with others.

- (iii) Now demonstrate how images/pictures are inserted in Write Activity. Give them time to observe closely and follow the procedure to insert images/ pictures.
- (iv) Ask learners to complete Activity 5.4 in their Pupil's Book.
- (v) Go round ensuring each learner is doing the right thing.
- (v) Allow learners to explore and insert pictures from storage devices.
- (vi) Help learners understand the concepts by asking them questions on the tasks learnt.

Assessment

Assess learners' ability to insert pictures and images.

Teacher's Notes

It is important for the learner to have pictures or images saved in the Journal or other external storage devices, they can insert these images/pictures in the document they are working on. This can be useful when they want to explain the topic they are writing about using a an image or picture. Pictures and images generally add interest to documents making them more appealing.

(b) Resize and position an Image and Picture and providing text to inserted image

Learning Activities

- (i) Learners to practise in pairs then individually on how to resize pictures and images.
- (ii) Practise on inserting comments on a picture.

Lesson Preparation

- Avail chats showing steps to follow when resizing pictures/ images. Allow them to refer from the Pupil's Book page 54.
- Ensure learners have enough XO laptops or sugar in a disk.
- Always ensure the projector is set early enough to avoid interrupting the lesson.

Teaching Steps

- (i) Ask learner to resize images and pictures the same way they resized rows and columns. Observe closely to see how they carry out the task.
- (ii) Encourage learners to speak about the task and compare what they have done with others.
- (iii) Now demonstrate how images/ pictures are resized in Write Activity. Give them time to observe closely and follow the procedure to resize images/pictures. Allow them to refer from Pupil's Book page 54.
- (iv) Go round ensuring each learner is doing the right thing.
- (v) Allow learners to explore and insert pictures from storage devices.

- (vi) Help learners understand the concepts by asking them questions on the tasks learnt.
- (vii) Ask them to type simple comments around the inserted pictures and images.
- (viii) Go round helping learners with difficulties to do this task.

Assessment

- Assess learner's ability to resize images.
- Use the assessment to plan for suitable learning/teaching methods.

Teacher's Notes

It is important for the learner to know that if they have pictures saved in the Journal or storage device, they can insert them into the document they are working on and resize to desired size. This can be useful when they want to place a picture at a certain point in the document. Pictures and images generally beautify documents making them more appealing.

(a) Remedial Activity

Give learners oral questions on table features such as rows, columns, resize and cell. Provide true or false questions to test their levels of understanding on tables.

Give them simple questions on how to insert tables, insert rows and columns and insert pictures and images.

Design matching questions to test learners' understanding. Give them time to discuss in their groups.

Example of questions

Read the following statements. Indicate if **True / False**.

1. A table is a grid of cells arranged in rows and columns. **True / False**
2. A column is a set of data values appearing vertically in a table. **True / False**
3. The intersection of rows and columns form a cell. **True / False**
4. Match the following table features to the correct description.

Table feature	Description
(a) Column	(a) Defined by horizontal lines
(b) Row	(b) Where rows and columns intersect
(c) Resize	(c) Defined by vertical lines
(d) Cell	(d) Adjust row heights and column width

(b) Consolidation Activity

Give learners structured questions on how to create a table, insert rows, columns, resize and delete.

Provide questions where learners can pair and explain different table features to one another.

Organise learners in groups and let them discuss and answer these questions practically on their XO laptops.

Example of questions

1. Start Write Activity.
 - (a) Insert a table with 5 columns and 5 rows.
 - (b) Delete 1 column such that the table remains with 4 columns.
 - (c) Delete 1 row such that the table remains with 4 rows.
 - (d) Insert 2 columns and 2 rows in your table.
2. Explain the meaning of the following words as used in tables:
 - (a) Column
 - (b) Row
 - (c) Cell
 - (d) Resize

(c) Extension Activity

Ask learners write short notes on the importance of tables in the Write Activity.

Give them additional practise work on manipulation of tables and inserting pictures and images.

Give learners activities to describe different table features.

Example of questions

1. Using Write Activity, write short notes on how to create a table.
2. Start write activity.
 - (a) Use table tools to create your performance record table.
 - (b) Insert a column showing the subjects that you do.
 - (c) Insert two rows that will contain your target minimum and maximum scores in all subjects.
3. Create a table with 6 rows and 5 columns perform the following activities.
 - (a) Resize row 3
 - (b) Resize column 2
 - (c) Delete column 4
 - (d) Delete row 2
 - (e) Delete the whole table

Answers to Practice Activities 5

Practise Activity 5.1

For questions (i), (ii), (iii), (iv), (v) and (vi) supervise learners. Observe how they create a table, how they insert new rows, text, delete row, delete column and how they resize rows and columns.

Award marks for correct steps and finishing required tasks on time.

Practise Activity 5.2

- (i) Go round checking if learners have collected the right information.

- (ii) Observe and supervise to ensure learners create a table and inserted the required words.
- (iii) Observe how learners share and collaborate with the rest of the class.
- (iv) Check every step they use in creating their newsletter.

Possible Answers for Revision Activity 5

Number of periods: 2

1. Sheets
2. (a) Table tool
(b) The pictures of the tortoise has been resized.
3. Select
4. Create table
5. Observe learners activities. Award them marks for ability to draw shapes in Paint Activity and the ability to insert the shape in a Write Activity.
6. (a) Observe if learner is able to type in the table.
(b) The typed word is erased.
(c) The word erased in (b) above reappears.
7. The table tool
8. To activate the cell and enable the cursor to be active for typing.
9. (a), (b) and (c) Observe and award learners for ability to carry out stated tasks.
10. Assess ability of learner to do required task.
11. Observe learners activities and award marks for execution of tasks correctly.

Answers to Remedial, Consolidation and Extension Activities

(a) Remedial Activity

1. (a) True
2. (a) True
3. (a) True
4. (a) Column – Defined by vertical lines.
(b) Row – Defined by horizontal lines.
(c) Resize – Adjust row heights and column width.
(d) Cell – Where rows and columns intersect.

(b) Consolidation Activity

1. (a) Observe how learners insert a table with 5 columns and 5 rows.
(b) Supervise to ensure learners use the right procedure to delete column.

- (c) Supervise to ensure learners use the right procedure to delete 1 row.
2. (a) Column is defined by the vertical lines.
 - (b) Row is defined by the horizontal lines.
 - (c) Resize is to adjust row heights and column width.
 - (d) Cell is where rows and columns intersect.

(c) Extension Activity

1.
 - Start Write Activity then click the table drop-down arrow to assess table tools.
 - Click the table tool to insert a table. The table grid is displayed where you can choose the number of columns and rows using the mouse pointer.
2. Supervise and observe how learners created their performance record using table tools.
Award marks based on right steps being followed and completing in time.
3. Observe how learners resize rows, columns and delete rows, columns and table.
Award marks if the right steps are followed for this activity.

Topic Area: ICT

UNIT 6

:

COMPUTER RESEARCH

Number of periods: 8

Key Unit Competency

By the end of the this unit, the learner should be able to explore and use the Browse Activity and the use of e-mails (Sugar Interface).

Background Information

Computers were designed to process data, save data in storage devices and communicate via networked links called the internet. The internet has made research a reality hence people can investigate online to find out more information about something. We can use the Browse Activity in our XO laptops to search for useful information. This information can be used for both entertainment and empowerment.

Learning Objectives

1. Knowledge and Understanding

- Explain the role of using e-mails in real life.
- State all the steps involved in creating e-mails.
- State the process of logging in and logging out.
- State the process of writing and sending an e-mail.
- State the process of taking screen shots.

2. Skills

- Create an e-mail account.
- Be able to write, send and read e-mails.
- Manipulate, navigate Browse to access the information needed.
- Find and locate a world map and share the content in other activities.
- Analyse how to access the inbox e-mails.

3. Attitudes and Values

- Feel happy to have an e-mail account.
- Show respect when sending and receiving e-mails to or from different contacts.
- Appreciate the risk and importance of e-mail security.
- Appreciate the content found using the Browse Activity.

Summary Table of Lessons

Lesson	Content	Learner's Activities
1 Browse and use of E-mails	Creating an e-mail account.	Individual practice exercise on creating e-mails.
2 Browse and use of E-mails	Creating an e-mail account login and logout.	Individual practice exercise on logging in and logging out.
3 Browse and use of E-mails	Read, write and send e-mail.	Exercises on Writing, sending and reading e-mails.
4 Browse and use of E-mails	Read, write and send e-mail.	Write an e-mail to wish your friend happy birthday.
5 Browse Activity	<ul style="list-style-type: none"> • Navigating using Browse Activity. • Accessing the World map. 	<ul style="list-style-type: none"> • Group/pairs/ individual exercises on navigating and using the Browse Activity. • Find a map of Africa, Science notes about plants and a story book on animals.
6 Browse Activity	Accessing dictionary, Textbooks and Story books.	<ul style="list-style-type: none"> • Finding a world map and locating the East African countries on the map by zooming and taking screenshots. • Practice writing and commenting on the screenshots.
7 Evaluation	Revision Activity 6	Answering theory questions in Revision Activity 6.
8 Evaluation	Revision Activity 6	Practise exercises on creating and using e-mail.

Cross-cutting Issues

(a) Financial Education

Encourage learners to make good use of e-mail and Browse Activity. Inform them of the economic rewards linked to e-mail and browsing in future when they will be transacting their businesses.

By learning how to use e-mail and Browse Activity they will be doing all their business online hence the physical office will not be of great importance.

(b) Inclusive Education

Make learners understand that they are all equal regardless of their physical appearance. Let physically disabled learners be involved in creating their e-mail accounts and browsing web pages. Cultivate the values of care and concern among learners so that they can assist their disabled peers in using e-mail tables.

(c) Peace Education

Allow learners to choose their pairing friends when giving practical activities. Remember to shift members of groups from time to time to cultivate a spirit of sharing and accommodation among learners. Always encourage them to settle their personal differences on their own. Supervise them as they share their XO laptops.

(d) Standardisation Culture

The Browse Activity uses almost the same features found in any other browser application such as Mozilla Firefox, Internet Explorer, Google Chrome, Opera etc.

Notes to the Teacher

This unit requires the teacher and the learners to interact with the Browser Activity. Encourage learners to explore more on how to use Browse to access e-mails and do research. Ensure learners observe the computer best practices at all times when using Browse Activity. Encourage learners to stay safe online by not exposing their personal details to strangers and unknown websites.

In case the XO computer is not available remember to obtain at least one ordinary laptop or desktop computer in your school and use sugar on a stick.

6.1: Browse and the Use of E-mails

Number of periods: 4

Reference: Pupil's Book page 58, Teacher's Guide and XO laptop.

Learning Objectives

By the end of the lesson:

Knowledge and understanding

- Explain the role of using E-mails in real life.
- State steps involved in creating, writing and sending e-mails.

Skills

Create, write, send and read e-mails.

Values and Attitudes

- Feel happy to have an e-mail account.
- Show respect when sending and receiving e-mails.

Learning/Teaching Methods

- Explanation
- Practical
- Demonstration
- Pair and Share

Learning/Teaching Materials

- XO laptops
- Sugar on a disk
- Desktop computers
- Projectors
- Laptops
- Internet
- Charts

Learning Activities

- (a) Create an e-mail account. (b) Logging in and logging out.
(c) To write and send an email. (d) Read inbox e-mails.

(a) Creating an e-mail account

Lesson Preparation

- Avail chats showing steps to follow when creating e-mail accounts. Allow learners to refer from the Pupil's Book page 57.
- Ensure learners have enough XO laptops.
- Always ensure the projector is setup early enough to avoid interrupting the lesson.

Teaching/Learning Steps

- (i) Ask learners to have a look at the illustrations in their Pupil's Book page 59. Allow them time to describe these illustrations.
- (ii) Start the lesson by writing words concerning e-mail account on the board. Ask learners to try and define e-mail terminologies.
- (iii) Guide learners through the process of creating an e-mail account as outlined in the Pupil's Book pages 59.
- (iv) Now demonstrate how e-mail account is created. Give them time to observe closely and follow the procedure to create their own e-mail accounts.
- (v) Go round ensuring each learner is doing the right thing.
- (vi) Help learners understand the concepts by asking them questions on the tasks being done. Be keen to observe that pupils follow and apply the right procedure.

Assessment

Assess learners' progress in creating e-mail accounts. Use the assessment to plan for suitable learning/teaching methods.

Teacher's Notes

Every e-mail application comes with a message tab that contains the commonly used commands, which enable you to compose and send messages. This tab contains commands such as **compose, send, sent items, spam, reply, forward attachment** and so on.

A real e-mail application lets you create, send, receive and organise e-mail messages. It will also allow you to send and receive e-mail from any other web mail account.

(b) Logging in and Logging out

Learning Activities

1. Using Web mail account to Login.
2. Using Web mail account to Logout.

Lesson Preparation

- Avail chats showing login and logout screens. Allow learners to refer from the Pupil's Book page 60.

Teaching/Learning Steps

- (i) Let learners know that in this lesson they will learn how to login and logout of their new e-mail accounts.
- (ii) Start the lesson by asking learners to define the following terms:
 - (a) What is to Login?
 - (b) How can someone Logout of e-mail account?
 - (c) Ask learners to tell the difference when login from a closed web activity and when the web activity is open.
- (iii) Guide learners on how to login and logout of their e-mail accounts as outlined in the Pupil's Book pages 60.
- (iv) Go round ensuring each learner is using the right procedure.
- (v) Help learners understand the concepts by asking them questions on the tasks being done.

Assessment

- Assess learners' ability to login and logout of their e-mail accounts.
- Use the assessment to plan for suitable learning/teaching methods.

Teacher's Notes

To **login** also means to **signin**.

To **logout** also means to **signout**.

Depending on the kind of e-mail account that you and your learners are using, you might be required to find out how yahoo mail and gmail accounts operate when you login from a web browser.

- (i) Type in the email provider e.g Yahoo mail.
- (ii) Choose yahoo login
- (iii) Then click on signin.

When you type the address of an e-mail account in the address bar it takes you to the home page of that website. From the home page you can access the sign in form where you are required to type a user name and password then click on the sign in tab.

(c) Write and Send an E-mail

Learning Activities

- Exercises on writing, sending and reading e-mails.
- Compose and send e-mail to wish your friend happy birthday.

Lesson Preparation

- Avail chats showing how to create, attach documents and send e-mail. Allow learners to refer from the Pupil's Book page 60.

Teaching Steps

- (i) Ask learners to discuss reasons for sending or receiving letters.
- (ii) Let them know that e-mails are just like letters, only that they are sent or received online (electronically).
Write some terms associated with e-mails on the board for learners to define.
- (iii) Allow them time to refer on the available charts showing how to compose, send forward and reply to e-mail messages.
- (iv) Guide learners on how to compose new e-mail, reply to mail, attach files and send e-mail messages as outlined in the Pupil's Book pages 60.
- (v) Go round ensuring each learner is doing the right thing. Let learners write and send e-mails to each others e-mail accounts.
- (vi) Ask learners to complete Activity 6.4. To write and send an e-mail available in their Pupil's book.
- (vii) Help learners understand the concepts by assisting them to carry out tasks being done.

Assessment

- Give practise exercises to assess learners' ability to compose and send e-mail.
- Use the assessment to plan for suitable learning/teaching methods.
- Give additional work to learners with extra ability. Design remedial interventions for low achievers.
- Ask fast learners to assist those who miss out on some steps.

Teacher's Notes

When you click on compose tab it will display a Window where you can start typing text. Remember to type the subject for your e-mail and the recipients' e-mail address before clicking on the send button. Tell learners that they can send an e-mail with the same message to several recipients at the same time.

(d) Read Inbox E-mails

Learning Activities

Opening and reading inbox e-mails.

Lesson Preparation

- Avail chats showing e-mail inbox. Ask learners to read content in Pupil's Book page 60.

Teaching Steps

- (i) Start the lesson by writing a few terms used in managing inbox messages on the board for learners to define. Ask learners to explain the meaning of these terms.
(a) Sent message (b) Marked as important (c) Inbox messages.
Allow learners time to discuss in pairs.
- (ii) Guide learners on how to open and read e-mail messages as outlined in the Pupil's Book pages 60.
- (iii) Go round ensuring each learner is doing the right thing.
- (iv) Help learners understand the concepts by encouraging them to practise more.
- (v) Ask learners to complete Activity 6.5; Reading inbox e-mails.

Assessment

- Assess learners' ability to open and read e-mails.
- Use the assessment to plan for suitable learning/teaching methods.

Teacher's Notes

Inbox is the main folder where your newly delivered e-mail messages are kept. The Inbox is normally opened automatically when you login to read your e-mail. Apart from the inbox, there are other folders such as **spam folder** where unwanted mail are kept, **trash folder** where deleted messages are temporarily kept and others. You can also create your own folder to keep your personal e-mail such as Homework.

6.2: Browse Activity

Number of periods: 2

Reference: Pupil's Book page 61.

Learning Objectives

Knowledge and understanding

- Explain the process of accessing the dictionary, worldmap and storybooks from the Browse Activity.
- Outline the process of taking a screenshot.

Skills

- Find/access (a) a world map (b) Dictionary (c) Textbooks and storybooks.
- Take screenshots.
- Share a snapshot and bookmarks with friends.

Values and attitudes

Appreciate the content found using the Browse Activity.

Learning/Teaching Methods

- Explanation
- Practical
- Demonstration
- Pair and Share
- Collaboration

Learning/Teaching Materials

- XO laptops
- Sugar on a disk
- Desktop computers
- Projector
- Internet

(a) Access World Map

Learning Activities

- Navigating and using the Browse Activity.
- Accessing the map of Africa, Science notes and a story book on animals.
- Accessing maps and making screenshots.

Lesson Preparation

Avail chats showing steps on how to start Browse Activity. Allow learners to refer to their Pupil's Book page 62.

Teaching/Learning Steps

- (i) Start the lesson by asking learners a few questions on Browse Activity.
- (ii) Display images and illustrations showing how to navigate the Browse Activity.
- (iii) Guide learners on how to navigate and use the Browse Activity as indicated in the Pupil's Book page 62.
- (iv) Ask learners to complete Activity 6.8; Navigating using Browse Activity.
- (v) Go round ensuring each learner is doing the right thing.
- (vi) Help learners understand the concepts to use the Browse Activity to locate the world map.

Assessment

- Assess learners' progress in using Browse Activity to access the World map.
- Use the assessment to plan for suitable learning/teaching methods.

Teacher's Notes

To browse web pages you need to search or type the exact web address in the

address bar to view its contents. Once you have access to the home page of that website you can use the available hyperlinks or buttons to navigate the web. If you want to search for a specific topic let's say world map you need to open a search engine website such as Google, Wikipedia and so on.

(b) Access the Dictionary

Learning Activities

Accessing the dictionary, and searching for various words found in the dictionary.

Lesson Preparation

Avail chats showing steps on how to start Browse Activity and accessing the dictionary. Allow learners to refer to their Pupil's Book page 62.

Teaching/Learning Steps

- (i) Ask learners a few questions about the dictionary.
 - (a) What is an online dictionary?
 - (b) What other examples of online dictionaries do you know?
- (ii) Demonstrate to learners how to navigate and access the dictionary as indicated in the Pupil's Book page 62.
- (iii) If possible avail images and illustrations showing steps for accessing the dictionary.
- (iv) Go round ensuring each learner is doing the correct thing.
- (v) Help learners understand the concepts by giving them words to search for from the dictionary.

Assessment

- Assess learners' progress in using Browse Activity to access the dictionary.
- Use the assessment to plan for suitable learning/teaching methods.

Teacher's Notes

Different dictionaries are available in the internet, examples are Wordpress and Oxford dictionaries. To search for any dictionary of your choice you need to start by opening a search engine such as Google then on the search box type the preferred search word. Search words should be short and to the point.

(c) Access Textbooks and Story Books

Learning Activities

Practise exercises on using the search engine to access textbooks and story books

Lesson Preparation

- Avail chats showing steps on how to search and access textbooks, story books and world maps. Allow learners to refer in their Pupil's Book page 62.

Teaching Steps

- (i) Start the lesson by asking learners a few questions about textbooks, story books.
 - (a) What is an online textbook?
 - (b) Who has ever read an online textbook or story book?
- (ii) Guide learners on how to navigate and access online textbooks and story books as indicated in the Pupil's Book page 62.
- (iii) Go round ensuring learners are doing the correct thing. Allow them to read some of the browsed stories.
- (iv) Give them more practise activities.

Assessment

- Assess learners' progress in using Browse Activity to access online textbooks and story books.
- Use the assessment to plan for suitable learning/teaching methods.

(d) Share content from browse

Learning Activities

- Share visited websites using bookmark.
- Writing and commenting on the screenshots.

Lesson Preparation

- Avail chats showing steps on how to use bookmarks. Allow learners to refer to their Pupil's Book page 63
- Ensure learners have enough XO laptops or sugar in a disk and internet connectivity is available.
- Always ensure laptops are charged and projector is setup early enough to avoid interrupting the lesson.

Teaching Steps

- (i) Ask learners to explain briefly how they shared stories and other materials in the Write Activity. Ask them to explain how you will share the visited websites with someone else?
- (ii) Display illustrations showing steps for sharing content from browse.
- (iii) Allow learners time to refer from the available charts. Demonstrate how to share content as indicated in the Pupil's Book page 63.
- (iv) Go round ensuring each learner are sharing the browsed information.
- (v) Help learners understand the concepts by asking them questions on the tasks being done. Be keen to observe that pupils follow and apply the right procedure.

Assessment

- Assess learners' progress in using bookmarks to share with friends.
- Use the assessment to plan for suitable learning/teaching methods.

Teacher's Notes

A bookmark is a powerful tool available on Browser window. You can use it to share website links saved in bookmarks with other people.

Help learners locate the share button from the private icon. It looks like a white circle with a little black dot in it (at the top left side of the screen). In the private icon learners can select My Neighbourhood icon. This icon looks like a white circle with a ring of little black dots in it. By doing this, learners can allow friends to view and share their bookmarks.

(a) Remedial Activity

Give learners 'fill in blank' questions on e-mail terminologies.

Design activities involving matching e-mail terminologies to their respective descriptions.

Present pictures and, images showing e-mail account. Structure oral questions to help learners identify parts of e-mail account such as: Sign in, Search box, Compose, Inbox, and Sign out.

Example questions

1. A place where web addresses are typed is _____. (address box, address bar).
2. An e-mail is _____. (an electronic message, a written message)
3. Display the image of e-mail account and ask learners to identify features of email account such as search box, compose, inbox and logout.
4. Match the following e-mail and search engine terminologies to their correct descriptions.

Terminology	Description
(a) Browser	(a) Takes you to a new page within the website
(b) Home Page	(b) To fill in personal details
(c) Address bar	(c) Where search terms are entered
(d) Sign up	(d) The first page of a website
(e) Hyper-link	(e) Application for accessing web-pages
(f) Search box	(f) Where web addresses are entered

(b) Consolidation Activity

Give learners structured questions on how to login, compose and sign out of e-mail account.

Organise learners in groups and let them discuss the meaning of e-mail terminologies.

Example questions

1. Create an e-mail account and compose a new e-mail message.
2. Explain steps you will follow to read incoming messages.
3. In your groups, discuss the following e-mail terminologies.
 - (a) Browser
 - (b) Home page
 - (c) Address bar
 - (d) Web-mail account
 - (e) Sign up
 - (f) Sign in
 - (g) Hyper-Link
 - (h) Form

(c) Extension Activity

Let learners write short notes on how to sign in, sign up, and read email messages.

Instruct learners to write an essay on environmental management using write activity then attach the file and send to a friend via email.

Example questions

1. Write short notes on the following topics:
 - (a) Sing up
 - (b) Sing in
 - (c) Reading new messages
 - (d) Replying messages
2. Ask learners to access 2 online story books, bookmark them and share the bookmarks.
3. Start Browse Activity.
 - (a) On the address bar type www.wikipedia.org.
 - (b) Locate the search box then type world map.
 - (c) Write short notes about what you discover on this map.

Answers to Practise Activity 6.1

1. <http://www.google.com>
2. Story books for kids.
3.
 - (a) Children English Story Books.
 - (b) Free kids online.
 - (c) Tell your story today.

Possible Answers for Revision Activity 6

Number of periods: 2

Reference: Pupil's Book page 64.

1.
 - (a) It is used for research.
 - (b)
 - (i) • K – Search box.
 - J – Bookmarks.

- (ii) Click on one bookmark. Hover your pointer on the private icon on top of your screen. Click on my neighbourhood icon and allow your friends to view your bookmarks.
- (c) • Wikipedea • Ask.com • MNS • Bing • Yahoo search.
- 2. • Observe learners work. Award marks for ability to access the worldmap.
- Ability to zoom the map accessed.
- Ability to take and share a screenshot with friends.
- 3. A - Messages that is sent electronically
- 4. B - Signup
- 5. (i) Is where you type the recipients e-mail address.
- (ii) Helps you type the title of your message.
- (iii) A place where you can type your e-mail message.
- (iv) The button that allow you to attach files.
- 6. D- School
- 7. Assess ability of learners to recall procedure of creating an e-mail and typing the information. Steps:
 - (a) Type www.gmail.com on the address bar.
 - (b) Click on Create to open the sign up form.
 - (c) Fill in the form to create an account.
- 8. Read learners e-mail messages to know if correct content has been written. Observe if they can send e-mails.
- 9. • Sign into your account.
- On the screen menu click compose followed by new mail.
- Type text in the available text area.
- 10. (a) The person receiving the e-mail.
- (b), (c) and (d) – Observe learners activities and award marks appropriately.
- 11. (a) Yes
- (b) (i) It is a file that has been added to an e-mail.
- (ii) Pictures, documents

Answers to Remedial, Consolidation and Extension Activities

(a) Remedial Activity

1. Address bar
2. Home page
3. Form
4. Point at different features of e-mail account and let learners give answers.

5. (a) Browser – Application for accessing web pages.
- (b) Home page – The first page of a website.
- (c) Address bar – Where web addresses are typed.
- (d) Sign up – To fill in personal details.
- (e) Hyper-link – Takes you a new page with the website.
- (f) Search box – Where search terms are entered.

(b) Consolidation Activity

1. Observe learners closely as they create e-mail accounts and compose new e-mail messages. Award them marks basing on their speed and use of the right steps.
2. Login to your e-mail account using your username and password. Locate the inbox button and click on it. The new messages appear in bold.
3. (a) Application used to access web pages.
- (b) The first page of a website.
- (c) The bar where web addresses are entered.
- (d) E-mail account created using e-mail provider website such as yahoo, gmail, hotmail etc.
- (e) Filling a form for e-mail account.
- (f) Opening your e-mail account to read mail.
- (g) A link that takes you to a new page with the website.
- (h) A place where you enter personal details.

(c) Extension Activity

1. (a) When signing up for a new e-mail account, you will access a form where your details will be captured. Once a sign up form opens, you start filling in your personal details. Click submit when you finish entering your correct details.
- (b) For you to sign in to your e-mail account you need to type your username and password then click login button.
- (c) Sign in the click the inbox button to access the new e-mail messages.
- (d) To reply to a message, click the compose button then type your message. Remember to type the e-mail address for the recipient plus the subject of your message.

Topic Area: ICT

UNIT 7 : PROGRAMMING FOR CHILDREN

Number of periods: 20

Key Unit Competency

By the end of this unit, the learner should be able to perform arithmetic operations, draw geometric shapes using Turtle Art Activity and create dialogue and cartoons using Scratch Activity.

Background Information

Turtle Art allows students to use mathematical reasoning, problem solving, counting, measurement, geometry and computer programming to create beautiful images. This activity uses a turtle that accepts instructions for movement.

With visual programming blocks, you can snap together programs by combining them in ways to create anything you can imagine.

In P4, we used Turtle Art to draw rectangles, squares and circles. In P5 We shall draw more shapes as well as carry out arithmetic calculations using the Turtle Art activity.

We also learnt about instruction blocks in Scratch Activity where learners can create stories, games, and animations to share with others. Scratch is a visual programming language that will teach you how to program while having fun.

Learning Objectives

1. Knowledge and understanding

- Explain how Turtle Art can be used to draw geometric shapes.
- Identify and associate different Turtle instructions in order to perform calculations (arithmetic operations).
- Match a sprite with the meaning of the topic.
- Associate different commands to make a dialogue/ cartoon.

2. Skills

- Observe and correctly practice with the Turtle Art instructions
- Choosing the correct instructions needed to produce a geometric shape
- Ability to construct and produce different geometric shapes using Turtle Art instructions.
- Perform addition, subtraction, multiplication and division using Turtle Art instructions.

- Practice and manage correctly the components of scratch window.
- Create a dialogue matching the sprite Design cartoon.
- Create a dialogue by combining background and sound accordingly.
- Select the sprite and associate it with the background.

Attitudes and Values

- Conceptualise ICT contribution in the real life.
- Express the desire to draw more colourful drawings using Turtle Art commands.
- Appreciate the way of expressing ideas through projects.
- Be confident about the process of creating dialogues and cartoons.
- Be proud to arrange commands and produce animations.

Summary Table of Lessons

Lesson	Content	Learner's Activities
1 Drawing geometric Shapes	Drawing regular polygons: hexagon, pentagon etc.	Group discussion on how to draw regular polygons using Turtle Art instructions.
2 Drawing geometric Shapes	Drawing regular polygons, hexagon, pentagon etc.	Practice drawing regular polygons by sequencing blocks correctly.
3 Drawing geometric Shapes	Drawing a parallelogram.	Group discussion on how to draw a parallelogram.
4 Drawing geometric Shapes	Drawing a parallelogram.	Drawing parallelogram using Turtle Art instructions.
5 Drawing geometric Shapes	Drawing a rhombus.	Group discussion on how to draw a rhombus.
6 Drawing geometric Shapes	Drawing a rhombus.	Drawing rhombus using Turtle Art instructions.
7 Drawing geometric Shapes	Drawing a trapezium.	Group discussion on how to draw a trapezium.

8 Drawing geometric Shapes	Drawing a trapezium.	Drawing trapezium using Turtle Art instructions.
9 Arithmetic Operations	Addition	Individual and group work to perform addition using Turtle arithmetic operations.
10 Arithmetic Operations	Subtraction	Individual and group work to perform subtraction using Turtle arithmetic operations.
11 Arithmetic Operations	Multiplication	Individual and group work to perform multiplication using Turtle arithmetic operations.
12 Arithmetic Operations	Division	Individual and group work to perform division using Turtle arithmetic operations.
13 Create Dialogues and Cartoons	Spriting: paint, import, camera	In pairs or individually work on exercises to create dialogues using sprite according to a given topics.
14 Create Dialogues and Cartoons	Spriting: paint, import, camera	In pairs or individually work on exercises to create dialogues using sprite according to a given topics.
15 Commands and speeches	Commands and speeches	Commands in order to create a script.
16 Commands and speeches	Organization	Commands in order to create a script.
17 Working with backgrounds	Background setting (paint)	Practice creating and changing the backgrounds by drawing and painting.
18 Working with backgrounds	Background setting (import, camera)	Practice creating and changing the backgrounds by importing and taking pictures.
18 Working with backgrounds	Sound settings (record, import)	Inserting sound in a project.

19 Evaluation	Revision Activity 7	Answering questions in Revision Activity 7.
20 Evaluation	Projects and Activities	Practise on projects and other practical activities.

Cross-cutting Issues

(i) *Financial education*

Encourage learners to make good use of Turtle Art. Inform learners of economic rewards in the future when they advance in education. When they enroll for architectural courses in colleges and university learners will already have practical knowledge needed to further their training.

(ii) *Standardization culture*

Encourage learners to develop positive attitude and appreciate the production of quality shapes and interesting programs. Encourage both boys and girls to keep on practising and sharing their activities with others. This will help them develop a culture of self reliance and sharing as both boys and girls have the same rights and abilities in the 21st century World.

(iii) *Inclusive education*

Encourage learners to embrace Turtle Art and Sprite Activities. Try to discover the artistic talent that is usually inherent in many disabled children. Encourage learners with programming talents in using Turtle Art or scratch to keep on practising. Give them challenging projects that will keep them more focused to discover and explore programming activities. Encourage all learners to participate in class activities such as drawing geometrical shapes and using various blocks to create interesting programs.

Remind the learners that disability is not inability. Allow all learners including those with special needs to do what they can. Encourage them to do their best.

(iv) *Peace education*

Allow learners to choose their pairing friends when giving practical activities. Remember to shift members of groups from time to time to cultivate a spirit of sharing and accommodation among learners. Always encourage them to settle their personal differences on their own. Supervise them as they share their programming activities using XO laptops.

Notes to the Teacher

This unit requires both teachers and the learners to interact with Turtle Art and Scratch Activities. Encourage learners to explore how to use Turtle Art and Sprite to create complex shapes and programs during their free time. Ensure learners observe the computer best practices at all times when using programming activities. In case the XO computer is not available remember to obtain at least one ordinary laptop or desktop computer in your school and use sugar on a stick.

7.1: Drawing Regular Shapes

Number of periods: 8

Reference: Pupil's Book page 67, Teacher's Guide and XO laptop.

Learning Objectives

By the end of the lesson, the learner should be able to:

Knowledge and understanding

- Explain how Turtle Art can be used to draw geometric shapes.
- Identify different Turtle instructions in order to draw geometric shapes.

Skills

- Select and correctly associate Turtle Art instructions.
- Construct geometric shapes using Turtle Art instructions.

Attitude and values

Express desire to draw colourful shapes using Turtle Art commands.

Learning/Teaching Methods

- Explanation
- Practical
- Demonstration
- Pair and Share
- Discussion
- Group work

Learning/Teaching Materials

- XO laptops
- Sugar on a disk
- Desktops
- Projector
- Laptops
- Internet

Learning Activities

Drawing: (a) Polygons (b) Rhombus (c) Parallelogram (d) Trapezium

(a) Regular Polygons

Lesson Preparation

- Avail chats showing geometrical shapes. Allow learners to refer from the Pupil's Book page 67.
- Ensure learners have enough XO laptops or sugar in a disk
- Always ensure the projector is setup early enough to avoid interrupting the lesson.

Teaching/Learning Steps

- (i) Ask learners to observe pictures on page 67 and discuss what they are going to learn in the unit.
- (ii) Let learners attempt Activity 7.1. Mark their books and correct them where necessary.

- (iii) Show learners how to obtain the correct number of polygon sides through calculations.

Example:

5 sided polygon = $\frac{360}{5} = 75^\circ$ This means that a 5 sided polygon will have angles of 75° .

- (iv) Allow learners to practise drawing polygons of different sizes (6, 7, 8, 9...) in their exercise books.
- (v) Instruct learners to draw a hexagon using Turtle Art instructions.
- (vi) Encourage learners on how to speak about the task they are doing and compare their drawings with their peers.
- (vii) Guide learners through the process of creating a polygon as outlined in the Pupil's Book pages 68.
- (viii) Let them practise drawing different type of polygons using Turtle commands. Give them enough time to do the activities/tasks.
- (ix) Go round ensuring each learner is doing the right thing. Assist learners with difficulties.
- (x) Help learners understand the concepts by asking them questions on the tasks being done.

Assessment

- Assess learners' ability to draw polygons using Turtle instructions.
- Use the assessment to plan for suitable learning/teaching methods.

Teacher's Notes

A polygon has five or more equal sides and angles. Polygons include pentagons (5 equal sides), hexagons (six equal sides) and so on.

You obtain the angle of the polygon you want to draw by dividing 360 by number of sides you wish to have.

To draw a polygons in Turtle Art, you use the **Forward Command** and **Left/Right commands**. You can also use the Repeat command.

(b) Drawing a Rhombus

Lesson Preparation

- Ensure learners have enough XO laptops or sugar in a disk.
- Always ensure the projector is setup early enough to avoid interrupting the lesson.

Teaching Steps

- (i) Let learners know that in this lesson they will draw rhombuses using Turtle Art instruction blocks.
- (ii) Ask learners to explain what a rhombus is. Listen as they present their different explanations.

- (iii) Explain to them what a rhombus is in reference to Pupil's Book page 70.
- (iv) Instruct learners how to draw a rhombus as they did in the previous lesson. Let them refer to the available charts showing different geometrical shapes.
- (v) Encourage learners to speak about the task they are doing and compare their drawing with friends.
- (vi) Now demonstrate how a rhombus is drawn using Turtle Art commands. Give them time to observe closely and follow the procedure to draw their own rhombuses.
- (vii) Go round ensuring each learner is doing the right thing.
- (viii) Help learners understand the concepts by asking them questions on the tasks being done.

Assessment

- Assess learners' progress in drawing geometrical shapes.
- Use the assessment to plan for suitable learning/teaching methods.

Teacher's Notes

To draw shapes in Turtle Art use instruction blocks found in Turtle Art palette. A **rhombus** is a slanted square with 4 equal straight sides. Opposite angles of a rhombus are equal.

(c) Drawing a Trapezium

Learning Activities

- Individual assignment on calculating area and perimeters of the regular shapes.
- Group discussion on calculating areas and perimeters of the regular shapes.
- Practice drawing a trapezium.

Lesson Preparation

- Avail charts showing various trapezium shapes.
- Ask learners to refer to Pupil's Book page 70 – 71.

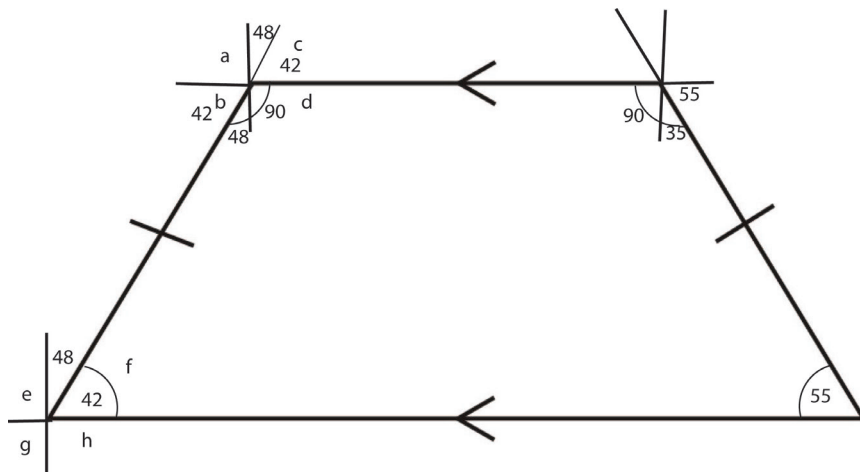
Teaching/Learning Steps

- (i) Let learners know that in this lesson they will draw trapezium using Turtle Art instruction blocks.
- (ii) Ask learners to explain what a trapezium is. Listen to them as they give their explanations.
- (iii) Instruct learners to draw a trapezium. Let them refer from the available charts showing different trapeziums.
- (iv) Encourage learners to speak about the task they are doing and compare their drawing with friends.
- (v) Guide learners through the process of drawing a trapezium as outlined in the Pupil's Book page 70 – 71.

- (vi) Now demonstrate how a trapezium is drawn using Turtle Art instructions. Give them time to observe closely and follow the procedure to draw their own trapeziums.
- (vii) Go round ensuring each learner is doing the right thing.
- (viii) Ask learners to draw various trapeziums by varying the forward and left/right commands.

Assessment

- Assess learners' curiosity to draw different types of trapeziums.
- Use the assessment to plan for suitable learning/teaching methods.
- Give additional work to fast learners. Ask fast learners to assist those who miss out on some steps.



Teacher's Note

When drawing a trapezium of any kind in Turtle Art activity it is important to note the following:

- Angles on a straight line add up to 180 for example $a + c + 48 = 180$
- Vertically opposite angles are equal for example $a = d, b = c$
- Corresponding angles are equal for example $c = f$
- Co-interior angles add up to 180 for example $d + f = 180$
- Alternate angles are equal for example $b = f$

7.2: Arithmetic Operations

Number of periods: 4

Reference: Pupil's Book page 71

Learning/Teaching Methods

- Explanation
- Pair and Share
- Demonstration
- Group work
- Practical

Learning/Teaching Materials

- XO laptops
- Sugar on a disk
- Desktop computers
- Projector
- Mathematics text books
- Notebooks

Learning Activities

- (a) Carrying out addition. (b) Carrying out subtraction.
(c) Carrying out multiplication. (d) Carrying out division.

(a) Addition

Lesson Preparation

- Avail chats showing the use of arithmetical operations. Allow learners to refer from the Pupil's Book page 72.
- Ensure learners have enough XO laptops or sugar in a disk
- Always ensure the projector is set early enough to avoid interrupting the lesson.

Teaching/Learning Steps

- Write the topic "Arithmetic Operations" on the board.
- Display charts showing worked examples of different arithmetic operations for learners to familiarize with.
- Ask learners to work out arithmetic operations involving addition of numbers in their notebooks.
- Guide learners through the procedure of using Turtle Art addition operations as outlined in the Pupil's Book pages 72. You can use examples from their mathematics Pupil's Book.
- Go round checking if learners are doing the correct thing. Assist slow learner by giving them personalised instructions. Assign additional work to fast learners.

Assessment

- Assess the ability to learners to perform addition using Turtle Art instructions.
- Use the assessment to plan for suitable learning/teaching methods.

Teacher's Notes

Assist learners through guided discovery to know that Turtle Art has a Number palette containing operators that are useful in carrying out mathematical calculations. Allow them to explore how to access the Number Palette and how to use the addition operator. Provide sums involving addition of 2 numbers, 3 numbers and so on.

(b) Subtraction

Lesson Preparation

- Avail chats showing the number palette. Allow learners to refer from the Pupil's Book page 72.
- Ensure learners have working XO laptops.
- Always ensure the projector is set early enough to avoid interrupting the lesson.

Teaching Steps

- (i) Ask learners questions on what they learnt about addition and what they know about subtraction.
- (ii) Allow learners to explain the meaning of subtraction as used in arithmetic. Assign them subtraction sums.
- (iii) Guide learners on how to use the Turtle subtraction operation as outlined in Pupil's Book pages 72.
- (iv) Give them simple questions for practise. Obtain the questions from existing mathematics books.
- (v) Go round ensuring each learner is doing the right thing.
- (vi) Help learners understand the concepts by assigning them more varied questions.

Assessment

- Assess learners' ability and ease of using subtraction operation.
- Use the assessment to plan for suitable learning/teaching methods.

Teacher's Notes

Subtraction is a mathematical operation that represents the operation of removing things from a collection. It is signified by the minus sign ($-$). For example, removing 2 oranges from a basket of 6 oranges ($6 - 2$ oranges). This means 6 oranges with 2 taken away, which gives a total of 4 oranges.

(c) Multiplication

Lesson Preparation

- Ensure learners have notebooks and pens.
- Ensure learners have enough XO laptops or sugar in a disk.
- Always ensure the projector is setup early enough to avoid interrupting the lesson.

Teaching Steps

- (i) Write 2 questions involving multiplication on the board. Ask learners to attempt them in their books. For example:

$$2 \times 1 =$$

$$3 \times 2 =$$

- (ii) Allow learners to discover how multiplication operation is carried out using Turtle Art instructions.
- (iv) Let one learner demonstrate how to use Turtle multiplication operation. Give learners time to observe closely and follow the procedure to complete their calculations.
- (v) Assign learners individual work on multiplication. Go round ensuring each learner is doing the right thing.
- (vi) Help learners understand the concepts by observing their tasks and helping them accordingly.

Assessment

- Assess learners' ability and enthusiasm of using multiplication operations.
- Use the assessment to plan for suitable learning/teaching methods.

Teacher's Notes

The basic idea of multiplication is repeated addition.

For example: $6 \times 3 = 6 + 6 + 6 = 18$

The symbol used for multiplication is '×'. For example, $3 \times 6 = 18$. This is read as **three times six is equal to eighteen** or simply, **three times six is eighteen**.

Note: Knowledge of multiplication is very important. Learners' confidence and ability to learn mathematics will depend largely on their knowledge of multiplication. So, they should aim practising a lot on multiplication.

(d) Division

Lesson Preparation

- Avail charts showing the number palette. Allow learners to refer to the Pupil's Book page 73.
- Ensure learners have enough XO laptops or sugar in a disk
- Always ensure the projector is set early enough to avoid interrupting the lesson.

Teaching Steps

- (i) Give learners object for them to share among themselves. Explain that sharing of things can be equated to division.
- (ii) Explain to the learners the meaning of division as used in arithmetic operation. Allow learners to refer from available charts showing the number palette.
- (iii) Guide learners on how to use division operation as outlined in the Pupil's Book pages 73.
- (iv) Demonstrate how they can use division operation. Give them time to observe closely and follow the procedure to complete their calculations.
- (v) Give them practice questions on division to work in pairs. Go round ensuring each learner is doing the right thing.

- (vi) Help learners understand the concepts by giving them more.
- (vii) Be keen to observe the following:
 - Pupils follow and apply the right procedure.
 - That slow and shy learners complete given task.

Assessment

- Assess learners’ progress in using division operations.
- Use the assessment to plan for suitable learning/teaching methods.

Teacher’s Notes

Before a learner is ready to calculate complex division sum, he/she has to know:

- Multiplication tables (fairly well).
- Basic division concept, based on multiplication tables (for example, $24 \div 6 = 4$ or $56 \div 8 = 7$).
- Basic division with remainders (for example, $55 \div 7 = 7 \text{ rem } 6$ or $23 \div 5 = 4 \text{ rem } 3$).

7.3: Create Dialogue and Cartoons

Number of lessons: 6

Reference: Pupil’s Book page 75.

Learning Objectives

By the end of the lesson, the learner should be able to:

Knowledge and understanding

- Match a sprite with the meaning of the topic.
- Associate different commands to create a dialogue.

Skills

- Manage correctly components of the scratch window.
- Create a dialogue matching the sprite.
- Combine sound and background accordingly to create a dialogue.

Learning/Teaching Methods

- Explanation
- Practical
- Demonstration
- Pair and Share
- Group work

Learning/Teaching Materials

- XO computer
- Sugar on a disk
- Desktops
- Projector
- Laptops
- Internet

Learning Activities

- (a) Spriting
- (b) Commands and speeches
- (c) Organisation
- (d) Backgrounds and sounds

(a) Spriting (Paint, Import, Camera)

Lesson Preparation

- Ensure learners have enough XO laptops or sugar in a disk.
- Always ensure the projector is setup early enough to avoid interrupting the lesson.

Teaching Steps

- (i) Introduce the lesson by asking learners to access the Scratch Activity.
- (ii) Ask learners to write a short dialogue for a particular theme e.g. student and teacher, parent and child etc. and identify its four major parts. Let learners do this in pairs.
- (iii) Demonstrate to learners using an example how to create a dialogue in sprite.
- (iv) Assist learners to do individual work by practising what is written in pupils book pages 75 - 77.
- (vi) Go round ensuring each learner is doing the right thing.
- (vii) Help learners understand the concepts by giving them more practise activities.

Assessment

- Assess learners progress in creating dialogues and cartoons.
- Use the assessment to plan for suitable learning/teaching methods.

Teacher's Notes

Scratch helps young people learn to think creatively, reason systematically, and work collaboratively which are essential skills for life in the 21st century.

(b) Commands and speeches

Lesson Preparation

- Ensure learners have enough XO laptops or sugar in a disk.
- Always ensure the projector is setup early enough to avoid interrupting the lesson.

Teaching Steps

- (i) Introduce the lesson by asking learners to access the scratch activity and individually write down all the commands.
- (ii) Ask them to discuss in groups the importance of each command block.
- (iii) Let learners drag selected commands from each command block into the script pane.
- (iv) Allow them to play with the commands.
- (v) Go round ensuring each learner is doing the right thing.
- (vi) Help learners understand the concepts by attending to their individual needs.

Assessment

- Assess learners progress in creating commands and speeches using blocks.
- Use the assessment to plan for suitable learning/teaching methods.

Teacher's Notes

To create dialogues and speeches, you have to create a script that your sprites will act. A **script** is made up of a collection of command blocks. It is important for the learners to know how each command block works. This will help them choose the right commands to use in their respective projects.

(c) Organization

Lesson Preparation

- Ask learners to create hand written scripts.
- Ensure learners have enough XO laptops or sugar in a disk.
- Always ensure the projector is set early enough to avoid interrupting the lesson.

Teaching Steps

- (i) Ask learners to tell short stories and to act dialogues in class. Let them write short scripts of the stories in their notebooks.
- (ii) Let them choose correct commands from the different command blocks and drag them to the script pane.
- (iii) Allow them to work in pairs then individually on story of their choice.
- (iv) Ask learners to practise organising several command blocks individually in order to create other dialogue.
- (v) Go round checking their work.

Assessment

- Assess learners abilities to organise command blocks.
- Use the assessment to plan for suitable learning/teaching methods.

Teacher's Notes

A script is created by grouping commands that convey certain information together.

(d) Background setting (Paint, Import, Camera and sounds)

Lesson Preparation

- Ensure learners have enough XO laptops or sugar in a disk.
- Always ensure the projector is set early enough to avoid interrupting the lesson.

Teaching Steps

- (i) Ask learners to click on the stage icon and see what happens.

- (ii) Allow them to explore the various backgrounds available.
- (iii) Ask them to observe how the sprites they have appear in different backgrounds.
- (iv) Guide them on how to set backgrounds depending on the scripts created as outlined in the Pupil's Book pages 80 – 81.
- (v) Give individual work to test their understanding. Assign them practice Activity 7.3 as class work. Let them do this activity in pairs.
- (vi) Revise with them Practise Activity 7.3 questions in order to help them understand how to work with sound setting in their dialogues and cartoons.

Assessment

- Assess learners abilities to setup stage background using paint, camera and import options.
- Use the assessment to plan for suitable learning/teaching methods.

(a) Remedial Activity

Give learners true or false questions to test if they are familiar with Turtle Art and Scratch Activity terminologies.

Present images and pictures showing sprite, stage and different Turtle Arithmetic instructions, Turtle Art blocks for drawing regular shapes then ask learners to identify these illustrations.

Formulate activities on how to use different instruction blocks and let learners practice individually or in pairs.

Example of questions

1. We draw shapes in Turtle Art using instruction blocks found in Turtle Art pallet.
 - (a) True (b) False
2. You can draw shapes by sequencing instruction blocks correctly. **True / False**
3. Create dialogue sprite will act. **True / False**
4. Use the following instruction blocks to draw a six sided polygon.
 - (a) Forward 200 (b) Left 60 (c) Repeat 6 times

(b) Consolidation Activity

Allow learners to access different regular shapes from the internet. Ask them to practise drawing some of these shapes in pairs.

Provide learners with 8 or more questions testing application of arithmetic operations. Assign them individual tasks.

Example of questions

1. When you use the repeat command you should also use the Start command. Explain why it is necessary?
2. Explain the following words as used in sprite activity:
 - (a) Spriting (b) Paint Option
 - (c) Import Option (d) Camera

3. (a) Organise learners into pairs. Let them practice drawing rhombus using the Turtle Art command blocks.
- (b) Ask them to use the Turtle Arithmetic commands to calculate the perimeter of the rhombus.

(c) Extension Activity

Design activities where learners will write short notes on the following topics: drawing regular shapes; create dialogue and cartoons; commands and speeches.

Ask learners to complete individual activities on drawing complex regular shapes using Turtle Art. Let them practice creating dialogue and cartoons using scratch activity.

1. Use write activity to type short notes on the following topics:

(a) Drawing regular polygon shapes	(b) Parallelogram
(c) Rhombus	(d) Trapezium
(e) Drawing a 6 sided polygon in Turtle Art	(f) Arithmetic operations
(g) Background setting	
2. Draw three different regular shapes using Turtle Art.
 - (a) Calculate the perimeter of these shapes.
 - (b) Calculate the Area of these shapes.

Answers to Practise Activities 7

Practise Activity 7.1

1. Observe low learner start Turtle Art Activity and navigate to Arithmetic operations.
 - (a) Supervise the whole session to ensure learners subtraction operator to get the right answer (i.e. $88 \text{ km} - 50 \text{ km} = 38 \text{ km}$).
 - (b) Supervise to ensure learners use multiplication and division operators to calculate the number of kilometres covered each day

$$10 \text{ days} = 50 \text{ km}$$

$$1 \text{ day} = ?$$

$$\frac{1 \times 50 \text{ km}}{10 \text{ days}} = 5 \text{ km}$$

2. Observe how learners use arithmetic operation to multiply \times height to get the area of a parallelogram.

$$\text{base} = 10$$

$$\text{height} = 6 \text{ cm} = \text{Area of parallelogram} = 10 \times 6 = 60 \text{ cm}$$

Practise Activity 7.2

1. Bedroom photograph
2. Go round checking how learners use the XO camera to take images of various backgrounds.
3. Observe if learners follow the right steps to change Sprite to that of a bee.
4. Go round observing how learners discover on how sound setting is done using set and import options.
5. Counter check and mark learners notebooks for the correct descriptions.
6. (a) Counter check learners notebook for the correct answers.
(b) Go round checking if learners have inserted the flower-bed background.
(c) Ensure learners have shared their work. Award marks accordingly.

Possible Answers for Revision Activity 7

Number of periods: 2

Reference: Pupil's Book page 82

1. Move one step forward
2. (a) Palette (b) Main Area
3. (a) Turtle (b) The stage
4. Observe learners activities. Award marks for use of correct command blocks and correct drawings.
5. (a) Addition, subtraction, multiplication and division
(b) Folders
6. Importing
7. A script is a collection or stack of blocks that interlock with one another.
8. (a) A background is a setting where the sprite acts from.
(b) Loice used paint option (location).
(c) Evaluate learners work to see if it is identical to what is given.
9. (a), (b) and (c) - Check learners individual work. Award marks for correct activity done.
10.
 - Click the upload sprite from file icon
 - The storage folders window pops up
 - Click the picture folder or any other folder containing your image
 - Select the image you want
 - Click insert
11.
 - **Sound Editor** - provides options for editing sound files.
 - **Edit** - tab displays options to undo, redo, cut, copy, paste, delete, and select all.
 - **Effects** - tab displays options such as fade in, fade out, louder, softer, silence and reverse.

- **Play sound** - will run the selected sound file.
- **Stop all sound** option will stop all running sound files.

Answers to Remedial, Consolidation and Extension Activities

(a) Remedial Activity

1. (a) True
2. (a) True
3. (a) True
4. Observe and follow learners closely as they use instructions blocks to draw a six sided polygon. At the end of the period counter check and give marks based on the shapes drawn.
5. Observe learner closely as they use given pixels to draw a trapezium. At the end of this period counter check and give marks based on the shape drawn.

(b) Consolidation Activity

1. The repeat command helps you to avoid writing the same commands several times. On the other hand Start Command will help you run your Turtle Art script.
2. (a) Spriting is the act of creating or modifying objects that act for use in dialogues and cartoons.
 - (b) The Paint option gives you a background with tools that allow you to draw and paint sprite of your own choice.
 - (c) This option allows you to choose different sprite from the existing one.
3. Supervise the whole session to ensure learners use and follow the right procedure. Award marks based on effective use of command blocks and pixel values.

(c) Extension Activity

1. (a) To draw regular shapes:
 - Use the forward command and left / right command.
 - You can also use repeat command to repeat same actions.
- (b) Arithmetic deals with counting and calculations of numerical data. Turtle Art has a number palette that contains operators useful in carrying out mathematical calculations. When you click on this palletete, several operations are displayed. These include: addition, subtraction, multiplication and division.
- (c) Dialogue and cartoons can be created as scratch projects in Scratch Activity. These projects can then be shared among Scratch Activity users we use the following to create dialogue and cartoons: Sprite, paint options, import option and the camera.

Topic Area: Our Environment

UNIT 8

:

WATER

Number of periods: 16

Key Unit Competency:

The learner should be able to purify water for drinking and explain the dangers of polluted water.

Background Information

Water is a very important substance. It is the main component of the earth as it covers about 71% of the earth's surface. Water is important for survival of plants and animals. The amount of water on earth is constant. It circulates through the water cycle continuously.

Safe unpolluted water is essential for humans, plants, animals and other life forms. Polluted water harms many living organisms. It is therefore important to keep our water sources clean.

Learning Objectives

(a) Knowledge and Understanding

- Explain the importance of water.
- List various sources of water.
- Identify properties of water.
- Explain the components of the water cycle.
- Explain the effects of rain water.
- Identify the dangers of rain water and how to prevent them.
- Explain methods of protecting the environment from rain water.
- State sources of water pollution Explain dangers of polluted water
- Identify and differentiate between different methods of water purification.
- Explain different water storage techniques.

(b) Skills

- Make a simple water filter.
- Produce drinking water through filtration, chemical treatment and boiling water.
- Plant trees and make ditches as methods of protecting the environment from rain water.

Attitudes and Values

- Develop a positive attitude to the environment and protection of water sources from pollutants.
- Appreciate the importance of water hygiene as a way to prevent diseases associated with diarrhoea.
- Appreciate the need for good habits to keep and conserve clean water.
- Practise ways to avoid water pollutants.
- Develop a positive attitude towards avoiding stagnant water as a way to control water borne diseases.
- Show concern about the protection of the environment.

Summary Table of Lessons

Lesson	Content	Learner's Activities
1 Importance of water	Identification of importance of water as human food, in sanitation, in farming and in industries.	Identifies the importance of water at home and in school.
2 Importance of water	Identification of importance of water in farming and in industries.	Identifies the importance of water in the farm and in industries.
3 Sources and properties of water	Sources of water: <ul style="list-style-type: none">• Natural sources• Man-made sources	Groups water sources into man-made and natural sources of water.
4 Sources and properties of water	Properties of water.	Identifies properties of water.
5 Rain water	Water cycle	Carries out an experiment to discover a simple water cycle.
6 Rain water	Effects of rain water(positive and negative effects).	<ul style="list-style-type: none">• Visits places near school or home to identify the effects of rain water.• Discusses the effects of rain water.

7 Methods of protecting the environment from rain water	Protecting the environment from rainwater by: <ul style="list-style-type: none"> • Planting trees • Making terraces 	<ul style="list-style-type: none"> • Outlines the methods of protecting the environment from rain water. • Plant trees.
8 Methods of protecting the environment from rain water	Protecting the environment from rainwater by: <ul style="list-style-type: none"> • Making ditches • Cultivating anti-erosive plants. 	<ul style="list-style-type: none"> • Outlines the methods of protecting the environment from rain water. • Makes ditches to protect the environment from rain water.
9 Water pollutants	Identification of water pollutants.	Recognise water pollutants in nearby water sources and in other places.
10 Water pollutants	Identification of water pollutants.	Recognise water pollutants in nearby water sources and in other places.
11 Dangers of water pollution	Identification of dangers of water pollution.	<ul style="list-style-type: none"> • Identifies dangers of water pollution and ways of preventing water pollution. • Practises measures to prevent water pollution.
12 Water purification methods	Purifying water using chemicals, filtering, boiling.	<ul style="list-style-type: none"> • Identifies water purification methods. • Purifies water by : boiling, putting in chemicals and filtering.
13 Making a water filter	Making a water filter using locally available materials.	Makes a water filter using locally available materials.
14 Water storage	<ul style="list-style-type: none"> • Storing water for general purposes. • Storing water in clean portable bottles for drinking. 	<ul style="list-style-type: none"> • Identifies ways of storing water for general use and for drinking. • Carries portable water for drinking.

15 Evaluation	Revision Activity 8	Answers theory questions in Revision Activity 8.
16 Evaluation	Project	<ul style="list-style-type: none"> • Plants trees and anti-erosive plants and also makes ditches. • Stores portable water for drinking.

Cross-cutting issues

(a) *Financial Education*

Learners should understand that water is an important resource. Therefore endeavour to develop a sense of conserving water as they use it. Let them use water sparingly and reuse water when possible e.g. use water used for rinsing clothes to mop the floor and turn off all taps when they are not in use.

(b) *Standardisation culture*

Learners should always use clean water for general purposes like cleaning, washing and bathing. Learners should also drink clean boiled or chemically treated water. Portable water for drinking should be put in clean containers. Learners should be able to identify polluted water and avoid using it.

(c) *Inclusive Education*

Identification of water sources, water pollutants and ways of controlling water pollution involve field visits. During such visits, assist disabled to move about. Other learners can carry them or help them move. The school can also provide wheel chairs to aid movement if possible.

Allow learners to interact with their disabled peers normally. Always ensure that learning activities and all class discussions make learners know that disabled people are important members of the society.

(d) *Environment and Sustainability*

Guide learners to develop values such as care and concern for the environment. This can be achieved if they are able to observe the effects of water pollution and empathise with the situation that human beings, plants and animals are put in because of water pollution. Let them be able to conserve and protect water sources knowing that life can only be sustained if there is clean water.

Ensure that learners understand the impact of deforestation on the water cycle. Let them learn to plant trees both as a way of ensuring continuity of the water cycle as well as a way of preventing the effects of rain water.

(e) *Peace and Values Education*

Allow learners to share experiment materials such as pans and sources of heat in a peaceful manner. Let them know that many conflicts arise due to inability to share resources like water, animal pastures et.c. By learning to share, they

can avoid conflicts and live in harmony. Encourage them to hold values like tolerance, care and concern, love and empathy as they interact with each other.

Notes to the teacher

Teach this unit with practical and field work as much as possible. Develop values of care and concern for the soil and good agricultural practises by exposing learners to affected areas. Discuss freely the effects of soil erosion. Give room for positive discussions and feedback from learners.

8.1: Importance of Water

Number of periods: 2

References:

- Pupil's Book page 86
- Internet
- Relevant textbooks
- Magazines

Learning Objectives

By the end of the lesson, the learner should be able to:

Knowledge and understanding

Explain the importance of water.

Skills

Recognising the importance of water.

Attitudes and Values

- Interpersonal relationship.
- Responsibility.
- Care for water.

Learning/Teaching Methods

- Group discussion
- Question and answer
- Observation
- Manipulation

Learning/Teaching Materials

- Charts/photographs
- Pictures showing uses of water
- Water, mops, pieces of cloth
- Laptop, books in the library

Learning Activity

Group discussions to identify the importance of water.

Lesson preparation

Ask learners to write down three daily uses of water.

Teaching/Learning Steps

- (i) Ask learner to observe introductory pictures in Pupil's Book page 85.
Let them discuss in pairs to identify the pictures as well as predict what they are going to learn in the unit.
- (ii) Display chart showing uses of water. You can also let them observe pictures in Pupil's Book page 86.
- (iii) Ask learners to identify uses of water in their homes and at school.
- (iv) Let them identify uses of water shown in Activity 8.1.
- (v) Allow learners to wipe windows, desks and tables using water. Let them clean the classroom and wash their hands after cleaning.
- (vi) Explain to them uses of water highlighted in Pupil's Book pages 86 – 89.
- (vii) Let the learners copy in their notebooks Practise Activity 8.1 in the Pupil's Book page 86 and fill in correctly.

Assessment

- Assess their knowledge of the uses of water at home and in school and their surroundings.
- Allow learners to give other uses of water not mentioned in the Pupil's Book.

8.2: Sources of Water

Number of periods: 1

References:

- Pupil's Book page 90
- Relevant textbooks
- Internet
- Magazines
- XO laptop

Learning Objectives

By the end of the lesson, the learner should be able to

Knowledge and understanding

List various sources of water.

Skills

Recognise sources of water.

Attitude and Values

- Cooperation.
- Effective communication.

Learning/Teaching Methods

- Brainstorming
- Field visit
- Discussions
- Observation

Learning/Teaching Materials

- Charts
- Pictures
- Laptop
- Library books
- Water sources

Learning Activities

- Visit water sources near the school.
- Group discussions to identify sources of water in their district.

Lesson Preparation

- Ensure learners have pens and notebooks.
- Ensure all learning and teaching materials are available.
- Prior visit to identify water sources in your district.

Learning/Teaching Steps

- (i) Take learners for a field visit to observe sources of water.
- (ii) Let them record their findings in their notebooks.
- (iii) Ask the learners to present their findings to other members of their class.
- (iv) Assign learners to discussion groups. Let them observe charts and pictures in their books.
- (v) Allow learners to discuss natural and man-made sources of water in their district.
- (vi) Ask them to use the XO laptops or books in the library to identify natural and man-made sources of water that are not in their district.
- (vii) Assign them Activity 8.3 and 8.4 as homework.

Assessment

Listen to learner discussion. Assess if they can identify water sources in the district as well as distinguish between natural and man-made water sources.

8.3: Properties of Water

Number of periods: 1

References:

- Pupil's Book page 92.

Learning Objectives

By the end of the lesson, the learner should be able to

Knowledge and understanding

Identify properties of water.

Skills

Investigate properties of water through experimentation.

Attitudes and Values

- Working with others.
- Effective communication.

Learning/Teaching Methods

- Observation
- Experimentation
- Question and answer
- Note taking

Learning/Teaching Materials

- Chart
- Water in a container
- A transparent glass
- Lids
- Salt

Learning Activity

- Investigation to discover the properties of water.

Lesson Preparation

Ask learners to collect the materials needed and come with them to class.

Learning/Teaching Steps

- Ask learners to get into their discussion groups.
- Ask them to investigate properties of water as outlined in Activity 8.4 in Pupil's Book page 91.
- Let the learners discuss the properties they have investigated in their groups.
- Write them on the board.
- Explain to them the properties identified and other relevant properties.

Assessment

Go round checking their participation and communication skills and record them.

Notes to the teacher

- Boiling point of water varies depending on its surrounding pressure. Water has a higher boiling point at higher atmospheric pressure and a lower boiling point at low atmospheric pressure.
- At higher atmospheric pressure (sea level) boiling point is 100°C. At low atmospheric pressure (high attitude areas) boiling point is about 93°C.

8.4: Rain Water its dangers and prevention of its dangers

Number of periods: 4

References:

- Pupil's Book page 93
- XO laptop
- Internet
- Relevant textbooks

Learning Objectives

By the end of the lesson, the learner should be able to:

- Explain the stages of the water cycle.
- Explain the effects of rain water.
- Identify the dangers of rain water and how to prevent them.

Skills

- Creative thinking.
- Effective communication.

Attitudes and Values

- Working in groups.
- Self esteem.

Learning/Teaching Methods

- Observation
- Discussion
- Question and answer
- Story telling

Learning/Teaching Materials

Charts, Charcoal stove/burner (source of heat), pan, water, Pictures in book, XO laptop

Lesson preparation

- Ensure all learning and teaching materials are available.

Learning Activities

- Investigation to discover a simple water cycle.
- Outlining effects of rain water on the environment.
- Protecting the environment from rain water.

Learning/Teaching Steps

- (i) In their learning groups let them perform the experiment in Activity 8.5 in Pupil's Book page 92
- (ii) Let them discuss the process of condensation, evaporation and precipitation in their investigation. They can also use their XO laptop to research.
- (iii) In pairs, ask the learners to read the story about effects of rain water on the environment in Pupil's Book page 94.

- (iv) Let them answer questions in their notebooks as class work. Go round marking their work.
- (v) Collect sweet potato vines, tree seedlings, hoes, machetes and tape measure.
- (vi) In their working groups, ask them to make terraces, others to plant sweet potato vines and others to plant tree seedlings.
- (vii) Ask them to take care while using the tools as they can hurt themselves.
- (viii) Ask them to clean the tools after use.
- (ix) Let them take care of their plots in turns, water the trees and vines and protect them from animals.
- (x) Ask them to make short notes on ways of preventing dangers of rainwater.

Assessment

Check the learners participation and record in a rag-table.

Notes to the teacher

(a) Evaporation

It happens when the sun rays heat up water bodies. Some of the water heats up to become vapour. The vapour then rises into the atmosphere.

(b) Transpiration

It occurs when sun rays heat plant leaves. The leaves loose water in vapour form to the environment. Transpiration occurs through the stomata of plant leaves.

(c) Condensation

Water vapour that rises into the atmosphere cools to form liquid water. The water droplets combines with other particles into the atmosphere to form rain clouds.

(d) Precipitation

When rain clouds are very heavy with too much water, the water is let to fall on the earth surface as precipitation. Precipitation refers to all forms of water that falls onto the earths surface.

8.5: Water Pollutants, dangers and their prevention

Number of periods: 3

References:

- Pupil's Book page 98
- Internet
- XO laptop
- Relevant textbooks

Learning Objectives

By the end of the lesson, the learner should be able to state sources of water pollution and explain dangers of polluted water.

Skills

- Observation
- Presentation
- Preventing water pollution
- Effective Communication

Attitude and Values

- Self awareness.
- Taking care of water.
- Working with others.
- Appreciating the use of water.

Learning/Teaching Methods

- Brain storming
- Group discussion
- Observation
- Field visits
- Water source
- Note taking

Learning/Teaching Materials

- Charts
- Pictures / charts
- Pictures in Pupils book
- Cut-outs
- Water source
- Pens and books

Learning Activity

Visiting various sources of water to identify water pollutants, dangers of water pollution and ways of preventing them.

Learning/Teaching Steps

- (i) Visit a polluted water source for learners to observe and identify water pollutants and their dangers.
- (ii) Ask learners to make a report of their observations.
- (iii) Allow them to make presentations in class.
- (iv) Display charts and pictures showing water pollutants.
- (v) Ask learners to look at the charts and pictures and then discuss them.
- (vi) In group discussions, let learners make notes on what they have observed. Let one of them present to their classmates.

Assessment

1. Mark learners work to assess the effectiveness of the field visit as a learning method.
2. Assess their ability to articulate ideas to highlight the dangers and prevention of water pollution.

8.6: Water Purification Methods and making a water filter

Number of periods: 2

References:

- Pupil's Book page 102
- Magazines
- Relevant textbooks
- Internet
- XO laptop

Learning Objectives

By the end of the lesson, the learner should be able to identify and differentiate between different methods of water purification.

Skills

- Creative thinking.
- Observation.
- Effective communication.
- Make a simple water filter.

Attitude and Values

- Develop curiosity about water purification.

Learning/Teaching Methods

- Experimentation
- Observation
- Group discussions
- Note taking

Learning/Teaching Materials

- Charts
- Pan/pot with a lid
- Sieve/white piece of cloth
- Materials for making water filters on Pupil's Book page 103.
- Source of heat
- Water (from river/dam)
- Small containers

Learning Activities

- Identify the water purification methods.
- Experiment on water purification.

Lesson Preparation

Make sure all learning and teaching materials are available.

Learning/Teaching Steps

- Let the learners sit in their working groups.
- Let them discuss and identify different water purification methods.
- Note them down and exchange with other groups.
- Allow the group leader to read their points.

- (v) Write their ideas on the board for everybody to read.
- (vi) Guide them on how to carry out an experiment on water purification Pupil's Book page 102. Let them answer the questions after the experiment.
- (vii) Allow them to make a water filter as outlined on page 103 as their class work.

Assessment

- Mark the learners work in class to assess their mastery of the content
- Assess how they are making a water filter in class.

8.6: Water Storage

Number of periods: 1

Reference: Pupil's Book page 104, Teacher's Guide and Internet.

Learning Objectives

By the end of the lesson, the learner should be able to explain different water storage techniques.

Skills

- Bring portable drinking water to school.
- Apply different ways of storing water.

Attitude and Values

- Appreciate the importance of storing water.
- Care for the water.

Learning/Teaching Materials

- Pictures
- Drawings in Pupil's Book
- A chart
- Real objects e.g. pots, jerry cans, tank, bottles

Learning/Teaching Methods

- Discussion
- Question and answer
- Group work

Learning/Teaching Steps

- (i) Ask the learners what they use at home to store water.
- (ii) Write them on the board. Display the chart.
- (iii) Display the real objects in their groups, let them discuss others storage containers that are not on the board.
- (iv) Let them observe pictures and drawing in Pupil's Book page 105 and name ways in which they can ensure they always have safe drinking water.
- (v) Allow the group leader to present to the other pupils.

- (vi) Encourage them to boil water and carry it in small portable bottles in order for them to always have safe drinking water.
- (vii) Let them role-play the games in Activity 8.13 at their own free time. Supervise them.

Assessment

Mark their work to assess what they have learnt.

(a) Remedial Activity

- Give learners oral questions for oral responses on importance of water.
- Give learners activities involving matching uses of water, sources of water and ways of purifying water to their pictures.
- Present pictures to learners that enable learners to mention the various uses of water, water pollutants and water purification methods.
- Provide gap filling questions for them to give short answers.

Example of Questions

1. Substances that cause harm to the living things in our environment are known as _____.
2. _____ is the loss of water through the stomata in plant leaves.

(b) Consolidation Activity

- Give learners structured questions, engage them in group discussion on effects and prevention of water pollution. Group leaders to present their findings.
- Give learners matching activities, gap filling questions as well as simple structured questions.
- Engage learners in role play in discussing the effects of water pollution.
- Give learners multiple choice questions e.g.

Example of Questions

Which among the following is the BEST method of purifying water?

- (a) Chlorination
- (b) Filtering
- (c) Adding salt
- (d) Boiling

(c) Extension Activity

- Let learners write short essay or report on the importance of water in their local homes, how water sources are polluted and how to prevent pollution of water.
- Allow learners research about other water pollutants and prevention.
- Learners to make water filters and rearrange the materials to come up with the most suitable filters.

- Learners to participate in an activity in their local area involved in controlling water pollution e.g. removal of solid waste along river banks.

Answers to Practise Activity 8

Practise Activity 8.1

- A
 - In diagram A, the water is used sparingly. That is just enough water is used to wash the utensils without wastage. In B a lot of water is going to waste from the running tap. Not all of it is utilised in washing utensils.
- (a), (c) and (d) – Recreation
 - (b) and (e) – Transportation

Practise Activity 8.2

- Provides water for home use.
 - Provides water for plants to grow.
 - Makes animal food to grow.
 - floods, traffic congestion, inability to do some activities.
- It has both good and bad effects (refer to 1 above).
- Observe learners working see whether they can locate the map of Rwanda and indicate Rwamagana, Gicumbi and Karongi on it.

Possible Answers for Revision Activity 8

Number of periods: 2

Reference: Pupil's Book page 105 – 106

- Sanitation:** refers to the cleanliness of the body and the surroundings.
- Farming
 - Sanitation
 - Cleaning tools
 - Mixing chemicals
- crops-herbicides
 - animals-pesticides
- Irrigation is watering of crops.
- It is colorless
 - It is tasteless
 - It has a boiling point of 100 degrees
 - It has a melting of 0 degrees
 - It has no smell
 - It is a good solvent
- Causes floods and landslides.
 - Causes soil erosion.
 - Causes water borne diseases when there is too much rain.

- Destroys the infrastructure.
 - Disrupts peoples activities.
7. (a) The water is polluted by waste from factories being dumped into the water source.
 - (b) By avoiding draining industrial waste and domestic sewage into water sources.
 8.
 - Polluted water may contain germs and parasites that affect people and livestock.
 - Dissolves chemicals may poison human beings and animals.
 - When polluted water is used in farming it pollutes the soil making it unfit for farming.
 - Water with excess fertilisers, pesticides or herbicides make the land dry.
 - Polluted water kills soil microorganisms.
 - When oil or solid waste covers the water surface it prevents sunlight reaching water plants.
 - Water animals such as fish die due lack of adequate oxygen when oil floats on water.
 9.
 - Practise proper hygiene.
 - Avoiding bathing, watering animals and washing clothes in the water sources.
 - Practice farming methods that reduce soil erosion.
 - Avoid draining of industrial waste and domestic sewage into water sources.
 - Solid wastes should be disposed properly.
 - Clear accidental oil spills as soon as they happen.
 - Use of controlled amount of farm chemicals such as fertilisers, pesticides and herbicides
 10. (a) (i) boiling
 - (ii) filtration
 - (b) Boiling and chlorination because:
 - In boiling the high temperature kills micro-organisms in the water.
 - In chlorination the chemicals kill the micro-organisms in the water.
 11. (a) use filtration method to remove observable waste.
 - (b) Make the water safe for drinking by boiling.

Answers to Remedial, Consolidation and Extension Activities

(a) Remedial Activity

1. Pollutants
2. Transpiration

(b) Consolidation Activity

- (b) Boiling

Topic Area: Our Environment

UNIT 9 : SOIL

Number of periods: 14

Key Unit Competency

By the end of the unit the learners should be able to prepare soil for cultivation and use fertilisers.

Background Information

Agriculture plays a very important part in the development of our country. It is therefore necessary to ensure that sustainable agricultural methods are employed. Learners need to appreciate the fact that agriculture is a major source of income to the people and the country.

Learning Objectives:

1. Knowledge and Understanding

- Identify the steps of soil preparation for cultivation.
- Explain the importance of fertilisers.
- Identify rules of applying fertilisers.
- Identify types of fertilisers.

2. Skills

- Prepare soil for cultivation.
- Select fertilisers.
- Prepare organic fertilisers.
- Proper use of fertilisers.

3. Attitude and Values

- Develop positive attitude towards the use and care of fertilisers
- Respect the sequence of steps of preparation of soil for cultivation.
- Appreciate the importance of fertilisers in our environment.
- Show concern for dangers of the misuse of fertilisers and its effects on crops production.
- It is therefore important to prepare land properly and use manure and fertilisers to promote high yields.

Summary Table of Lessons

Lesson	Content	Learner's Activities
1 Preparation of soil for cultivation	Land clearing	Preparing plots for cultivation by clearing the bush.
2 Preparation of soil for cultivation	• Ploughing	Preparing plots for cultivation by ploughing.
3 Preparation of soil for cultivation	Primary cultivation	Preparing plots for cultivation by practising primary cultivation.
4 Preparation of soil for cultivation	Secondary cultivation	Preparing plots by practising secondary cultivation.
5 Preparation of soil for cultivation	Levelling	Preparing plots for cultivation by levelling soil.
6 Fertilisation of soil for cultivation	Organic fertilisers	• Categorising organic fertilisers.
7 Fertilisation of soil for cultivation	Organic fertilisers	• Preparing compost manure.
8 Fertilisation of soil for cultivation	Inorganic fertilisers	Identifying straight and compound fertilisers.
9 Fertilisation of soil for cultivation	Inorganic fertilisers	Classifying straight and compound fertilisers.
10 Importance of fertilisers	Rules of applying fertilisers	Apply fertilisers following specific rules.
11 Importance of fertilisers	Use of organic and inorganic fertilisers.	Investigate the effects of specific types of fertiliser on plant growth.
12 Importance of fertilisers	Use of organic and inorganic fertilisers.	Investigate the effects of specific types of fertiliser on plant growth.

13 Evaluation	Revision Activity 9	Answering theory questions in Revision Activity 9
14 Evaluation	Revision Activity 9	Answering practical questions in Revision Activity 9

Cross-cutting Issues

(a) *Environmental and Sustainability*

Soil is a major component of the environment. Animals and plants depend on soil either directly or indirectly. Land preparation methods should be environmentally friendly. Use of organic fertilisers is encouraged as they do not pollute the environment. Controlled use of chemical fertilisers should be observed to protect our environment. It is important to observe rules and regulations towards the application of chemical fertilisers.

(b) *Peace and Value Education*

Land is a natural resource. As the population increases, land becomes a source of many conflicts.

Learners need to be taught the importance of sharing this national resource for sustainable peace.

Respect for personal property should be encouraged.

(c) *Gender Education*

The teacher should avoid stereotypes and bias when handling this topic. Both genders should be encouraged to participate in the activities of the lesson.

(d) *Inclusive Education*

Learners with special needs need to be assigned duties for inclusivity. They should be fully incorporated in the lesson and allowed time to carry out duties.

The teacher needs to be patient with them.

Notes to the Teacher

The teacher should teach this topic as practically use of possible. Develop values of care and concern about our environment. Discuss the fertilisers freely. Let the learners appreciate use of fertilisers as a way of increasing food production. Give room for positive discussion and feedback from the learners.

Fertilisers are used to enrich soil. They contain minerals. There are two main categories of fertilisers. These are chemical fertilisers and natural fertilisers. Natural fertilisers include farmyard manure, green manure and compost manure. Chemical fertiliser are bought in shops. They are used during planting or for top dressing. Chemical fertilisers are grouped majorly as compound or straight fertilisers. Straight fertilisers contain many types of nutrients. Example include: CAN; $\text{Ca}(\text{NO}_3)_2$ $\text{NH}_4\text{NO}_3 \cdot 10\text{H}_2\text{O}$ and DAP; $(\text{NH}_4)_2\text{HPO}_4$.

Single fertilisers contain one major type of nutrient. Example include: SSP; $\text{Ca}(\text{H}_2\text{PO}_4)_2$ and Urea; $\text{CO}(\text{NH}_2)_2$.

9.1: Preparation of Soil for Cultivation

Number of periods: 5

Reference: Pupil's Book page 108 and Internet.

Learning Objectives

By the end of this lesson, the learners should be able to:

Knowledge and understanding

- Identify steps of soil preparation for cultivation.
- Distinguish between primary cultivation and secondary cultivation.
- Explain levelling of soil.

Skills

- Prepare soil for cultivation.
- Ploughing the soil.
- Levelling the soil.
- Land clearing.
- Primary cultivation and secondary cultivation.

Attitudes and Values

- Respect the sequence of steps for the preparation of soil.
- Develop positive attitudes towards good land preparation methods.
- Appreciate well prepared land for cultivation.

Learning/Teaching Methods

- Discussion
- Practical activity
- Demonstration
- Questions and answers

Learning/Teaching Materials

- Pictures
- Seeds
- Tools such as machetes, hoes, rakes
- Pupils books
- Charts

Learning Activities

- Preparation of soil for cultivation.
- Lesson preparation.
- Gather all relevant tools and materials.
- Identify a suitable site for land preparation.
- Read the content in Pupil's Book page 108.

Teaching Steps

- (i) Ask learners to observe the introductory pictures, briefly describe each picture and predict what they are going to learn in the unit.
- (ii) Organise learners into groups of 5. Assign the learners plots of land.
- (iii) Let learners start preparing the soil for cultivation by following the steps outlined in Activity 9.1 on page 108.
- (iv) Explain to the learners each step after they have finished carrying out.
- (v) Display charts and pictures in class. Let the learners discuss the steps of land preparation shown.

Assessment

Assess the learners' ability to:

- Identify all the activities involved in land preparation.
- Practice the land preparation activities before planting maize seed in their plots.

9.2: Fertilisation of Soil for Cultivation

Number of periods: 4

Reference: Pupil's Book page 111 and Internet.

Learning Objectives

By the end of this lesson, the learners should be able to:

Knowledge and understanding

Identify organic and chemical fertilisers.

Skills

- Select fertilisers
- Prepare organic fertilisers

Attitudes and Values

- Appreciate the importance of fertilisers in our environment
- Show concern in the proper use of fertilisers.

Learning/Teaching Methods

- Practical activity
- Group discussion
- Observation
- Brainstorming

Learning/Teaching Materials

- Organic fertilisers
- Chemical fertilisers
- Plot of prepared land
- Charts

Learning Activity

- Identifying different types of fertilisers.
- Preparing organic manures.

Lesson Preparation

- Obtain different types of fertilisers: organic and inorganic.
- Read the content in the Pupil's Book.
- Collect materials for preparing organic manure.

Learning/Teaching Steps

- (i) Assign learners into groups of 6 pupils.
- (ii) Allow learners collect various for making organic fertilisers and obtain some inorganic fertilisers from shop as outlined in Activity 9.2 in learners book.
- (iii) Allow learners to classify the materials obtained into natural and artificial fertilisers.
- (iv) Ask learners to prepare compost manure following the steps outlined into Activity 9.3 page 113.
- (v) Display charts of the activities in the classroom and the learners discuss them.
- (vi) Discuss the various types of organic manure and how to prepare them.
- (vii) Guide the learners in a discussion on chemical fertilisers and their contents.
- (viii) Let the learners discuss the advantages and disadvantages of using fertilisers.
- (ix) Allow the learners to use the fertilisers on plots of land.

Assessment

- Assess the learners' ability to correctly make compost manure.
- Assess learners' ability to correctly group fertilisers as organic and inorganic.
- Award marks for correct presentation and positive attempt.

9.3: Importance of Fertilisers and Rules for Applying them

Number of periods: 3

Reference: Relevant agriculture books, Pupil's Book page 115, Internet.

Learning Objectives

By the end of the lesson, the learners should be able to

Knowledge and understanding

Explain importance of fertilisers and the rules for applying them.

Skills

- Proper use of fertilisers.
- Investigate the specific effects of a specific type of fertiliser.

Attitudes and Values

- Show concern for the dangers of the bad use of fertilisers and its effect on crop production and plant health.

Learning /Teaching Methods

- Brainstorming
- Practical activity
- Demonstration
- Questions and answers
- Group discussion
- Discussion
- Observation

Learning /Teaching Materials

- Fertilisers
- Charts
- Plants
- Pictures

Learning Activity

- Investigating the importance of fertilisers.

Lesson Preparation

- Learner to read content in Pupil's Book page 115.
- Obtain the different types of fertilisers.
- Research different types of fertilisers and rules of applying them.

Learning/Teaching Steps

- (i) Allow learners to choose specific types of fertiliser.
- (ii) Let the learners read rules of applying fertilisers as outlined in Activity 9.4 on Pupil's Book page 116.
- (iii) Allow them to apply these fertilisers to plots where they planted maize.
- (iv) Supervise them when applying the fertilisers.
- (v) Put learners in groups of 5. Ask them to group the fertilisers into organic and chemical ones.
- (vi) Ask them to discuss the difference between natural and chemical fertilisers. Help them to understand better by participating in their discussion.
- (vii) Ask learners to make a report on the proper application of fertilisers and make their presentation in the classroom.

Assessment

Assess the learners' ability to

- (i) Apply the correct amount of fertiliser using protective clothing.
- (ii) Group fertilisers as natural and chemical.

(a) Remedial Activity

- Learners to list down, in order, steps of land preparation and describe their importance.
- Learners to practice all land preparation activities in their school farm as the teacher observes and gives guidance.
- Oral questions to be used during the activities for oral responses.
- Give learners structured questions on fertilisers.

Example of questions

1. Fertilisers are MAINLY grouped into _____ and _____.
2. Four examples of organic fertilisers are ____, ____, ____ and ____.

(b) Consolidation Activity

- These activities should help learners recapture content on land preparation procedures, prepare natural fertilisers and rules of applying fertilisers.
- Let learners classify a list of chemical fertilisers into straight and compound fertilisers in a table for example:

Example of questions

1. Group fertilisers that you know as required in the table below.

Chemical fertilisers	
Straight	Compound
1. Urea	1. Diammonium phosphate
2. _____	2. _____
3. _____	3. _____
4. _____	

- Give learners multiple choice questions that help learners remember the taught content example.
2. Fertiliser that contain two or more major nutrients are known as _____.
(a) straight fertiliser (b) compound fertiliser
(c) manure (d) nitrogenous fertiliser

(c) Extension Activity

- Allow learners to research and write down the groups of straight fertilisers with their examples e.g. Nitrogenous fertilisers e.g. Urea, ammonium sulphate nitrate etc.
- Allow learners to stick labels on container and write on them important information that should be there e.g. composition of the fertiliser, rules of application.

- Learners to write short essay on how to apply manure and fertiliser in the farm and even on land preparation process.

Possible Answers for Revision Activity 9

Number of periods: 2

Reference: Pupil's Book page 118

- (c)
 - (a)
 - (b)
- Land clearing
 - Ploughing/primary cultivation.
 - Secondary cultivation
 - Levelling
- Secondary cultivation helps to break down huge lumps of soil into fine particles. It helps to increase the germination rate of seeds.
- Organic fertilisers are made from animal and plant waste or remains. They are natural fertilisers.
 - Inorganic fertilisers are made from chemicals in factories. They are artificial fertilisers.
 - Organic or natural fertilisers. They improve the physical properties of soils such as drainage, capillarity and water retention. It introduces decomposers to the soil.
- Straight
 - Compound
- Wood ash adds nutrients such as potassium and phosphorus into the manure.
- Plants that are almost flowering are cut and chopped into small pieces. These pieces are then ploughed into the soil and left to rot or decompose.
- Heap method is used when the weather is wet. It prevents dampening of the manure.
 - Pit method is used when the weather is dry. It prevents manure from excess heat.
- Farmyard manure
 - Compost manure
 - They take a long time to be ready for use.
 - They may contain weed seeds and micro-organisms.

10. (a) (i) Rake (ii) Machete (iii) Hoe

(b) (i) (ii)

(ii) (i)

(iii) (iii)

11. Observe learners project. Following guidelines on proper plant care, award learners marks at the end of the project.

Answers to Remedial, Consolidation and Extension Activities

(a) Remedial Activity

1. (a) Natural (organic) and Artificial (inorganic)

(b) Organic mulches, farmyard manure, green manure and compost manure.

(b) Consolidation Activity

Chemical fertilisers	
Straight	Compound
1. Urea	1. Diammonium phosphate
2. Single super phosphate	2. Calcium ammonium nitrate
3. Sulphate of potash	3. Monoammonium phosphate
4. Ammonium sulphate nitrate.	4. NPK: Nitrogen Phosphorous potassium

Topic Area: Our Environment

UNIT 10

ANIMALS

Number of periods: 12

Key Unit Competency

By the end of the lesson, the learner should be able to explain and carry out effective chicken farming.

Background Information

Poultry farming is part of modern farming. Keeping chicken is a source of income for many farmers. Chicken farming requires a small amount of space and is easy to manage. Farmers should be encouraged to keep chickens since there is a growing demand for meat and eggs. Meat and eggs are sources of protein.

Learning Objectives:

1. Knowledge and Understanding

- Identify the conditions of a good chicken house.
- Explain the different types of chicken breeds.
- Identify steps of chicken production.
- Explain how to feed chickens properly.
- Identify the most common diseases in chickens and say how they can be prevented.
- Explain the importance of practising chicken farming.
- Explain the poultry farming process.

2. Skills

- To prepare a small scale farming project.
- Apply techniques of poultry farming.

3. Attitudes and Values

- Show interest in poultry farming.
- Appreciate the socio-economic value of poultry farming.
- Desire to own a chicken farm as a way to increase meat and egg production as well as solving economic problems.

Summary Table of Lessons

Lesson	Content	Learner's Activities
1 Conditions of a good chicken house.	Identify features of a good chicken house. Construct a good chicken house.	<ul style="list-style-type: none"> • Recognise features of a good chicken house. • Field visit to observe and identify good features of a chicken house.
2 Types of breeds	Types of chicken breeds: Egg laying breeds, The meat type of chicken, The dual purpose type of chickens	<ul style="list-style-type: none"> • Identify the three types of chicken breeds. • Grouping chicken according to their breeds.
3 Reproduction of chickens	Process involved in reproduction of chicken: laying eggs and incubation.	Research in books, internet or charts on chicken reproduction.
4 Reproduction of chickens	Process involved in reproduction of chicken: natural brooding and artificial brooding	Discussing chicken reproduction.
5 Feeding of chicken	Proper feeding of chicken: commercial and local chicken feeds.	Discuss good feeding and hygiene practises for chicken.
6 Chicken diseases	Identify chicken diseases: parasitic diseases, infectious diseases.	Discuss diseases in chickens. Identifying chicken diseases.
7 Prevention of chicken diseases	Ways of preventing chicken diseases: Cleaning the coop, disinfecting the coop, quarantine, vaccinating chicken	Discuss ways of preventing chicken diseases.
8 Importance of chicken farming	Importance of keeping chicken: economical.	Discuss economic importance of keeping chickens.
9 Importance of chicken farming	Importance of keeping chicken: agricultural, nutritional	<ul style="list-style-type: none"> • Discuss economic importance of keeping chickens. • Discuss nutritional and agricultural importance of keeping chicken.

10 Chicken farming process	Start a chicken keeping project in school.	• Manage a small poultry farm at school.
11 Evaluation	Revision Activity 10	• Answer theory questions in Revision Activity 10.
12 Evaluation	Revision Activity 10	• Manage chickens.

Cross-cutting Issues

(i) *Financial Education*

- Learners should understand that Agriculture is the backbone of Rwanda's economy. Tell them that by learning how to keep animals like chicken and rabbits they obtain practical knowledge in farming. When we sell chicken or their products we can earn income. There are many farmers in Rwanda who earn a living by keeping chickens.
- The following are general benefits of keeping chickens:
 - (a) Chicken are kept for meat, eggs, manure or feathers.
 - (b) Chicken meat is high protein.
 - (c) Chicken droppings are a source of manure.

(ii) *Inclusive Education*

Learners should appreciate their differences. They should not discriminate against their colleagues with special needs. Involve all learners in classroom activities regardless of their physical limitations. If some learners need assistance, e.g. by being carried around or being led, assign special needs activities that they are able to do in order for them to feel they are part of the class, allowing them to develop lifelong skills.

(iii) *Peace and Values Education*

Allow learners to choose their pairing partners. Supervise them as they perform various activities. Let them share learning resources on their own both outside and inside the class. Teach them the importance of caring for animals like chickens by themselves. They should not let them roam around. When animals are not cared for they can destroy neighbours crops and lead to disputes.

(iv) *Environment and Sustainability*

Chickens play an important role in the food chain. For instance, they feed on some crop weeds and pests. Learners should also understand that for a farmer to obtain maximum profits and for the environmental components to balance, there is a need to keep the right number of chickens. Many chickens that are not well cared for destroy crops and lead to losses.

(v) Gender Education

There is a need to ensure that all learners feel that they are equal. Allow girls to handle chickens and manage them just as boys do. Let them be involved in activities like giving vaccines and feeding chickens. Do not assign them roles of only cleaning the chicken coop. Ensure that you visit poultry farms where women are involved in order for them to appreciate that animal keeping is also a woman's activity.

Chicken are prone to diseases and parasite attacks. Therefore they need a clean environment.

Notes for the Teacher

For effective coverage of this unit the teacher has to involve the learners in research, field visits, observations and group discussions.

Allow learners to interact in groups as this maintains peace and co-operation.

For a field visit, you need to make the trip in advance in order to assess the relevance of the visit to the lesson.

Prepare the learners on do's and don'ts during the visit.

Let the learners also prepare questionnaires that they will use during the visit. For example:

- (a) Which things do you need to consider before starting a poultry farm?
- (b) What are the conditions necessary for a good chicken house?
- (c) How is brooding done?
- (d) How are chickens reared?
- (e) What types of chicken feeds are there?
- (f) What is the importance of rearing chickens?

Strive to develop the following in learners:

- Communication skills
- Data collection method
- Presentation of findings

10.1: Conditions for a Good Chicken House

Number of periods: 1

References:

- Pupil's Book page 121
- Internet
- Relevant textbooks
- XO laptop

Learning Objectives

By the end of the lesson, the learner should be able to:

Knowledge and understanding

Identify the conditions necessary for a good chicken house.

Skills

Make a good chicken house.

Attitudes and Values

- Working in groups
- Interpersonal relationship
- Creative thinking

Learning/Teaching Methods

- Observation
- Question and answer
- Discussion
- Drawing
- Guided discovery

Learning/Teaching Materials

- Charts
- Pictures in books
- Real objects for example, a chicken house
- Pictures

Learning Activities

- Group discussions aimed at discovering the features of a good chicken house.
- Field visits to different chicken farms.
- Resource person(s).

Learning/Teaching Steps

- Ask learners to observe introductory pictures on page 120. Allow them to discuss in pairs about the identity of the pictures. Let them explain briefly what they will learn in the unit.
- Ask learners to attempt questions 2 in Activity 10.1 individually in their books.
- Allow learners to compare their responses in Activity 10.1 in groups of 4.
- Let learners make presentations in class. Give them probing questions to allow them discover conditions of a good chicken house. Correct them where necessary.

Assessment

Assess learners' ability to identify features of a good chicken house.

10.2: Types of Breeds

Number of periods: 1

References:

- Pupil's Book page 121
- Internet

- Relevant textbooks
- XO laptop

Learning Objective

By the end of the lesson, the learner should be able to:

Knowledge and understanding

- Explain the types of chicken breeds.
- Identify the qualities of a good chick to rear.

Skills

- Identify a good breed to rear.
- Manipulation.

Attitudes and Values

- Responsibility
- Curiosity know more about chicken breeds.

Learning/Teaching Methods

- Questions and answer
- Observation
- Group discussion
- Note taking
- Field visit

Learning/Teaching Materials

- Charts
- Pictures
- Real animals (chicken)
- Photographs
- XO laptop

Learning Activity

Identifying types of chicken breeds.

Lesson Preparation

- Ensure learners have pens and notebooks.
- Ensure all learning and teaching materials are available.

Learning/Teaching Steps

- (i) Take learners to a poultry farm near the school. Allow them to observe the chicken houses type of chicken breeds kept and how chicken are cared for.
- (ii) Let learners write short notes basing on questionnaires you provided them with.
- (iii) Display pictures and charts showing different chicken breeds.
- (iv) Let learners observe the features of the chickens. Ask them to discuss briefly about the pictures.
- (v) Allow them to browse on their XO laptop to see various breeds of chicken as well.
- (vi) Discuss with them content in Pupil's Book page 122. Ask them to write short notes in their notebooks.

Assessment

Check learners' confidence and communication abilities as they talk about chicken breeds.

10.3: Chicken Reproduction

Number of periods: 2

References:

- Pupil's Book page 123
- Internet
- Relevant textbooks
- XO laptop

Learning Objectives

By the end of the lesson, the learner should be able to identify the steps of chicken reproduction.

Skills

- Critical thinking
- Responding to questions.
- Apply basic techniques to chicken reproducing.

Attitudes and Values

- Show interest in reproducing chicken.
- Desire to reproduce chicken.
- Working with others.

Learning/Teaching Methods

- Observation
- Question and answers
- Storytelling

Learning/Teaching Materials

- Pictures
- XO laptops
- Photographs
- Charts

Learning Activities

Identify different types of chicken breeds.

Lesson Preparation

- Make sure that all teaching and learning materials are available.
- Ask learners to research in the library or using their XO internet 'Chicken reproduction'.

Learning/Teaching Steps

- (i) Ask learners to read the story in Activity 10.3 Pupil's Book page 123 in pairs.
- (ii) Ask them to discuss and answer questions in the story as well.

- (iii) Discuss with them how reproduction in chicken takes place as outlined in Pupil's Book pages 123 - 125.
- (vi) Ask them to research from their XO laptops about reproduction in chicken. Let them write short notes on the subtopic and present their findings in class.

Assessment

Listen to the learners as they read the story to gauge their literacy skills.

Listen to learners presentations to find out if they understand chickens reproduction.

10.4: Proper Feeding of Chicken

Number of periods: 1

References:

- Pupil's Book page 125
- Internet
- Relevant textbooks
- XO laptop
- Magazines

Learning Objectives

By the end of the lesson, the learner should be able to:

Knowledge and understanding

- Explain how to feed chicken properly.
- Identify the different types of chicken feeds.

Skills

Feeding chicken

Attitudes and Values

Develop curiosity towards keeping of poultry and other domestic animals.

Learning/Teaching Methods

- Observation
- Discussion
- Brainstorming

Learning/Teaching Materials

- Real object (feeds)
- Charts
- Photographs
- XO laptops
- Chicken

Learning Activity

Practising good feeding and hygiene for chicken.

Lesson Preparation

Make sure all teaching and learning materials are available.

Learning/Teaching Steps

- (i) Assign learners into groups, display charts and pictures and let them discuss the practise of good feeding and hygiene in chickens.
- (ii) Ask learners to research chicken feeding using XO laptop.
- (iii) Take them to a nearby poultry farm. Let them observe the different breeds of chicken and feeds given to them.
- (iv) Let them feed the chicken (if possible).
- (v) Let them write short notes about chicken feeding.
- (vi) When learners go back to school, ask them to discuss in groups poultry feeding and hygiene.
- (vii) Let them present their findings to the rest of the class.

Assessment

Assess the learners understanding of chicken feeds.

10.5: Chicken Diseases and Parasites and their Prevention

Number of periods: 2

References:

- Pupil's Book page 127
- Internet
- Relevant textbooks
- XO laptop

Learning Objectives

By the end of the lesson, the learner should be able to:

Knowledge and understanding

- Identify the signs and symptoms of an unhealthy chicken.
- Identify ways of preventing chicken diseases.
- Give the importance of keeping chickens healthy.

Skills

- Vaccinating chickens.
- Preventing chicken parasites.

Attitudes and Values

- Self awareness.
- Show concern for chicken health.

Learning/Teaching Methods

- Observation
- Discussion
- Question and answers
- Note taking

Learning/Teaching Materials

- Real object (chicken)
- Charts and pictures
- XO laptops

Learning Activity

Chicken diseases and ways of preventing them.

Lesson Preparation

Ask learners to research in the library or using their XO laptops internet “Common chicken diseases”.

Learning/Teaching Steps

- (i) Assign learners in discussion groups.
- (ii) Allow learners to discuss their findings on “common chicken disease”.
- (iii) Display the chart and photographs. Using relevant probing questions explain to them common chicken diseases.
- (iv) Ask them to write short notes in their notebooks.
- (v) discuss as a class general measures taken to prevent diseases in the poultry farm you had visited earlier.
- (v) Allow learners to tell how they prevent chicken diseases in their homes.

Assessment

Listen to learners contributions and answer to gauge if they have understood intended content.

10.6: Importance of Chicken Farming

Number of periods: 2

References:

- Pupil’s Book page 129
- Internet
- Relevant textbooks
- XO laptop
- Magazines

Learning Objectives

By the end of the lesson, the learner should be able to:

Knowledge and understanding

- Explain the importance of practising chicken farming.
- Start and implement a small scale poultry farm.

Skills

- Keep chickens.
- Recognize the importance of keeping chickens.

Attitudes and Values

- Desire to keep chickens.
- Develop an awareness on the value of keeping chickens.

Learning/Teaching Methods

- Observation
- Question and answers
- Group discussions
- Field visits

Learning/Teaching Materials

- Real objects (chicken)
- Photographs
- Charts
- CDS and projectors

Learning Activity

Group discussion on the importance of chicken farming.

Learning/Teaching Steps

- Ask learners to revisit Activity 10.3 and read paragraph 5. Allow them to talk about benefits of chicken in their homes.
- Display various photographs or CDs or projectors or charts showing chicken and their products.
- Let learners discuss in pairs and write short notes about what they have observed.
- Ask learners to read the importance of keeping chicken they have written.
- Write down the importance of chicken farming on the board.
- Ask them to write a brief report on the importance of chicken farming in their district based on their visit to a poultry farm earlier on.
- Mark their reports and let learners present some of the reports to the class.

Assessment

Assess their ability to present ideas logically highlighting the importance of keeping chickens.

10.7: Chicken Farming Process

Number of periods: 1

References:

- Pupil's Book page 130
- Relevant textbooks
- Internet
- XO laptop
- Magazines

Learning Objectives

By the end of the lesson, the learner should be able to:

Knowledge and understanding

Identify different ways of rearing chickens.

Skills

Managing a small chicken farming project.

Attitudes and Values

- Care for chicken.
- Appreciate the importance of rearing chickens.

Learning/Teaching Methods

- Observation
- Guided discovery
- Discussion

Learning/Teaching Materials

- Charts
- Pictures
- Books on chicken farming

Learning Activity

Practise rearing of chickens.

Learning/Teaching Steps

- (i) Learners to identify various ways of rearing chickens in their locality.
- (ii) Guide them to identify the common methods of rearing chickens. Display charts for them to observe pictures showing methods of rearing chicken.
- (iii) Let them refer to the Pupil's book page 131 to identify various ways of rearing chickens. Discuss the pictures and content in the Pupil's Book.
- (iv) Let them set up a project of managing a chicken farm in the school

Assessment

Assess their ability to recognise various chicken rearing methods.

Class Project: Starting a small scale poultry farm

- (i) Construct a poultry house using locally available materials.
- (ii) Put in water containers and feeding troughs.
- (iii) Provide both locally available and commercial chicken feeds.
- (iv) Bring chicken into the poultry house.
- (v) Ensure you clean the poultry house daily. Give the chicken clean water and feeds to prevent chicken diseases.
- (vi) Let every learner be involved by assigning them duties. This will help to promote responsibility and peace.

(a) Remedial Activity

- Learners to visit a chicken farm in their local area and list down: types of chicken houses, breeds of chicken and identify their products (Pupils can be guided using questionnaires).

- Give learners structured questions and gap filling questions on content learnt e.g. (1) Chicken reared for meat production are known as b _ _ i _ _ s
- Give learners matching questions on the animal with their products, e.g. (2) Match the given chicken breed with correct products.

Chicken	Product
(a) Broiler	(a) Eggs and meat
(b) Layers	(b) Meat only
(c) Dual purpose	(c) Eggs only

- Ask learners oral questions for oral answers on breeds of chicken their reproduction and importance of chicken farming.

(b) Consolidation Activity

- From knowledge gathered from the farm visit, the pupils to be in manageable groups and establish a chicken in school. Let them build a good chicken house and take care of the chicken in groups.
- Give learners structured questions an gap filling questions to be used in checking retention of content taught.

Example of questions

1. Name the 3 main types of chicken breeds.
2. Why is it important to clean a chicken coop regularly?

(c) Extension Activity

- Learners to research and identify the specific breeds of chicken commonly reared in the local area. They are to identify the other breeds reared in other areas.
- Leaners to write an essay or report on the local chicken diseases and parasites as well as preventive measures practised by the local farmers.

Example of questions

1. Identify 3 commercial feeds given to layers.
2. Describe briefly how you can keep chickens healthy?

Answers to Practise Activity 10.1

1. (a) Lack of calcium in their diet.
(b) Give them a diet consisting of good quality layer feed and crushed egg shell or oyster shell.
2. (a) Cannibalism in chickens is whereby chicken are kept close confinement and they peck one another.

- (b) • Allow the chicken in an enclosed outside run to keep them busy and allow them to peck greens, ground and insects.
- Provide large handful of fresh greens in their houses.

Possible Answers for Revision Activity 10

Number of periods: 2

Reference: Pupil's Book page 133.

1. Keeping of chickens for meat, eggs or both.
2.
 - Should have adequate lighting.
 - Should be built where there is good drainage.
 - The open side of the chicken house should face away from the direction of the wind.
 - Should be built where is no disturbance from people and animals.
 - Should have adequate space and good ventilation.
 - Should be built in a way that it will be easily cleaned.
 - Should be well built to avoid the leaks.
 - The lower walls should be well constructed to avoid predators.
3. (a) Egg laying/layers (b) Meat type/broilers (c) Dual purpose
4. (a) Incubation: This is when a hen sits on her egg for 21 days in order for them to hatch
 (b) Cannibalism: Is where domestic hens reared for eggs production eat all or parts of another hen.
 (c) Quarantine: This is separating a sick bird from the flock so that it does not spread the disease.
5.
 - Sheds some belly feathers and becomes warmer.
 - Stays in the nest longer than usual.
 - Does not lay many eggs.
 - Makes a croaking noise.
 - May be aggressive.
6. Coccidiosis and ascarids.
7. To control the spread of infections.
8. (a) • Source of food • Source of employment • Droppings from chicken can be used as manure in the farm • Chicken bones and egg shells make feeds for other animals • Chicken feed on insects that destroy crops
 (b) (i) Feathers
 (ii) Used to fill pillows and duvets

9.
 - Free range system
 - Deep litter system
 - Fold system
 - Battery system
10. (a)
 - they require less space to keep
 - chickens grow quickly
 - chicken feeds can be found easily
 (b)
 - Difficulty in finding balanced chicken feeds.
 - Difficulty in controlling chicken.
11. (a) Construct a chicken house for them, give them balanced feeds and water. Vaccinate them.
- (b) Keeping them in a good chicken house.
- (c) Chasing away predators.

Answers to Remedial, Consolidation and Extension Activities

(a) Remedial Activity

1. Broilers
 - a → b
 - b → c
 - c → a

(b) Consolidation Activity

1. Layers
Broilers
Dual purpose
2. To prevent chicken from being infected by pests and diseases.

(c) Extension Activity

1. Layers mash
Oyster shell
2. You can keep chicken healthy by feeding them properly, keeping their house clean, disinfecting the feeding and watering equipment and adding preventive drugs to chicken feeds or drinking water.

Topic Area: Our Environment

UNIT 11

:

PLANTS AND ENVIRONMENT

Number of periods:10

Key Unit Competency

By the end of the lesson, the learner should be able to explain the importance of plants and the effects that deforestation has on the environment.

Background Information

Plants are part of our environment. They play a pivotal role in making our environment healthy and habitable. They provide food, shade and give us oxygen. Trees also attract rain and this ensures a constant food supply for animals.

Learning Objectives

1. Knowledge and Understanding

- Discuss and explain the uses of different crops.
- Name different types of crops.
- Discuss and explain the uses of trees.
- Define and discuss the causes and effects of deforestation.
- Demonstrate ways of taking care of trees.

2. Life skills

- Recognise the types of crops.
- Organise the types of crops according to their uses.
- Observe different uses of trees.
- Describe the causes and effects of deforestation.
- Analyse different ways of look after trees.

3. Attitudes and Values

- Show a desire to protect trees.
- Show concern on how to fight against causes and effects of deforestation.
- Agree to protect and care for existing trees.

Summary Table of Lessons

Lesson	Content	Learner's Activities
1 Identification of importance of plants.	Human food (food crops).	Group discussion to identify the importance of plants.
2 Identification of importance of plants.	<ul style="list-style-type: none"> • Animal feeding. • Medicine plants. 	Group discussion to identify the importance of plants.
3 Identification of importance of plants.	<ul style="list-style-type: none"> • Cash crops. • Protection of environment. 	Group discussion to identify the importance of plants.
4 Common importance of trees on environment.	<ul style="list-style-type: none"> • Improves weather conditions. • Control soil erosion. 	<ul style="list-style-type: none"> • Investigate importance of trees in the locality • Write down importance of plants.
5 Common importance of trees on environment.	<ul style="list-style-type: none"> • Recycle air through photosynthesis. • Shelter for wild life and birds. 	Discussion on importance of trees.
6 Effects of afforestation on the environment.	Importance of afforestation.	Discuss importance of afforestation.
7 Effects of deforestation on the environment.	Causes of deforestation.	Discuss the causes and effects of deforestation.
8 Effects of deforestation on the environment.	Effects of deforestation.	Write a report about effects and causes of deforestation.
9 Evaluation	Revision Exercise 10.	Answer theory questions in Revision Activity 10.
10 Evaluation	Revision Exercise 10.	Writing and presenting reports.

Cross-cutting Issues

(a) *Environment and Sustainability*

- The rate at which trees are being cut down is higher than the rate they are being replaced.

- Demand for fuel and wood products is high. It is therefore important to replace the trees cut down. This will ensure that the environment is not destroyed.

(b) Peace and Value Education

- A forest is a resource. It plays big role in promoting harmony and peace. We need to share this resource for sustainable peace and development.

(c) Gender Education

- It is the responsibility of all to conserve the environment. Pupils of both genders should be sensitized on the importance of plants in our environment. The teacher should promote this during teaching.

(d) Inclusive Education

- The teacher should encourage friendly relationships between learners with special needs and normal learners.
- Pair the normal and special needs children to carry out activities together, this will help them to feel loved and part of the class.

Notes to the Teacher

Trees help in controlling soil erosion and holding the soil particles together. Trees act as wind breakers and therefore reduce the speed of wind. They also help in cleaning air by absorbing carbon dioxide in the atmosphere and releasing oxygen.

Agro-forestry is a practice where crops are grown together with trees; the trees should not be too close to allow crop to receive enough sunlight.

11.1: Identification of Importance of Plants

Number of periods: 3

References:

- Pupil’s Book page 135
- Internet
- Relevant textbooks
- XO laptop
- Magazines

Learning Objectives

By the end of the lesson, the learner’s should be able to:

- Explain uses of different crops.
- Name different types of crops.

Skills

- Recognise the type of crops.
- Group the types of crops according to their uses.

Attitudes and Values

Show sustainable desire to protect and care for the plants.

Learning/Teaching Materials

- Different types of crops
- Charts
- Pictures
- Herbal medicines

Learning/Teaching Methods

- Discussion
- Observation
- Question and answer
- Brainstorming

Learning Activities

Identifying the importance of plants.

Lesson Preparation

- Read the content in Pupil's Book page 135.
- Ask the learners to bring different types of plants.
- Obtain relevant charts and pictures before the lesson.

Learning/Teaching Steps

- Let learners observe and briefly describe the introductory pictures. Let them predict what they will learn in this unit.
- Take learners to a nature walk around the school locality. Ask them to identify cash crops that are grown.
- Let them also identify food crops and medicinal plants.
- When back in class, ask learners to name different types of plants they know.
- Write their answers on the board.
- Display charts with various plant parts. Display some examples of herbal medicines.
- Lead a discussion on various uses of plants.
- Allow learners to write crops used as cash crop, human food, animal feed and for medicinal purpose.
- Lead the learners into a discussion on other importance of plants.
- Organise crops according to their uses.

Assessment

Assess the ability of a learner:

- To recognise various types of crops.
- To explain uses of different types of plants.

11.2: Common Importance of Trees on Environment

Number of periods: 2

Reference: Pupil's Book page 142 and Internet.

Learning Objectives

By the end of the lesson, the learners should be able to

Knowledge and understanding

Explain the uses of trees.

Skills

- Observe different uses of trees.
- Investigate different uses of trees.

Attitudes and Values

Show a desire to protect trees.

Learning/Teaching Materials

- Pictures.
- Charts.
- Trees in the school compound.
- Products made from wood.

Learning/Teaching Methods

- Nature walk.
- Discussion.
- Question and answer.
- Observation.

Learning Activity

Investigating the importance of trees for the environment.

Lesson Preparation

- Read the content in Pupil's Book page 142.
- Obtain the necessary charts and pictures.
- Identify some trees in the school compound and assess their relevance to the lesson.

Learning/Teaching Steps

- (i) Ask learner to answer questions (a) and (b) in Activity 11.4 on page 140.
- (ii) Allow learners to discuss the importance of trees for the environment based on their responses to question (c).
- (iii) Ask them to list some different types of trees. Help them to discover how trees are useful to the environment.
- (iv) Display some objects made from trees.
- (v) Let the learners discuss the type of trees found in their homes and their uses in their groups: ornamental, fruit trees, agro-forestry, timber trees and fuel trees.
- (vi) Ask them to write down the uses discussed. Mark their work.

Assessment

Assess ability of learners to discuss and explain various uses of trees.

11.3: Effects of Afforestation and Deforestation on the Environment

Number of periods: 3

Reference: Pupil's Book page 145 and Internet and other relevant textbooks.

Learning Objectives

By the end of the lesson, the learner should be able to:

Knowledge and understanding

- Define and discuss the causes and effects of deforestation
- Demonstrate ways of taking care of trees.

Skills

- Describe the causes and effects of deforestation.
- Analyse different ways of maintaining trees.

Attitudes and Values

- Show concern on how to fight against causes and effects of deforestation.
- Agree to protect and care for the existing trees.

Learning/Teaching Materials

- Charts
- Photographs
- XO Computer

Learning/Teaching Methods

- Group discussion
- Question and answer
- Science walk
- Class activity

Learning Activity

Discuss the effects of afforestation and deforestation on the environment.

Lesson Preparation

- Visit a forested area and a deforested area.
- Get some magazines, pamphlets and photographs showing deforestation and forest conservation.
- Obtain relevant charts.
- You can invite a resource person for the lesson.

Learning/Teaching Steps

- (i) Allow learners to visit a planted forest near their school.

- (ii) Ask learners to observe the soil around the forest and the animals living in the forest.
- (iii) Let the learners feel the air around the forest.
- (iv) Allow learners to visit a place without trees. Ask them to compare the environment of this place and the environment of the forest.
- (v) Lead the learners to plant trees around the school.
- (vi) After all these activities, ask the learners to discuss and write short notes on:
 - (a) Importance of afforestation.
 - (b) Causes of deforestation.
 - (c) Effects of deforestation.
 - (d) Prevention of deforestation.
- (vii) Research and write more about effects of deforestation and ways of maintaining trees.

Assessment

- Assess learners' ability to observe and record importance of afforestation, causes of deforestation and effects of deforestation.
- Assess the ability of preventing deforestation by taking care of the trees they planted.

Teacher's Notes

Guidance on conducting a debate:

1. Ask learners to divide themselves into two equal groups.
2. Let them choose three people to head the debate: Chairperson and two secretaries.
3. Let one group support the idea that "Conserving forests is better than planting a new forest."
4. Let the other group disagree by supporting the idea that "Planting a new forest is better than conserving an existing one"
5. Let them debate in turns. Ask their secretaries note down the points on either side.
6. Discuss the points raised on both sides in your class.
7. From the discussion, ask learners to write down short notes on why we need to prevent deforestation.

(a) Remedial Activity

- Give matching for learners to identify importance of trees and other plants in the environment.
- Allow learners to verbally say uses of trees and plants that they know.

- Provide gap filling questions and multiple choice questions to enable learners identify effects of deforestation and afforestation to the environment.

Example of Questions

1. Planting trees where there were no trees is known as _____.
2. Which among the following is an effect of defforestation?

(a) Heavy rainfall	(b) Dry river beds
(c) Increased reproduction in wildlife	(d) fertile soil.

(b) Consolidation Activity

- Let leaners discuss and make presentation in class on importance of trees and the environment.
- Give learners structured and open ended questions based on the content covered.
- Allow learners to debate about importance of afforestation.
- Give learners questions involving classifying plants and outlining their importance.
- Give learners “fill in gap” questions on effects of deforestation.

Example of Questions

1. Identify any 4 uses of plants.
2. Describe briefly any 3 importance of trees on the environment.

(c) Extension Activity

- Ask learners to list down major plants grown in their district.
- Let learners classify them (cash crops and food crops, medicinal) and state their uses.
- Ask learners to research on medicinal plants in Rwanda and cash crops grown in Rwanda.
- Learners to write a short essay on effects of deforestation and the need to conserve trees.

Example of Questions

1. Name any 3 plants that are fed to cows in your area?
2. Write a brief report on causes of deforestation, effects of deforestation and ways of preventing deforestation.

Answers to Practice Activities 11

Practise Activity 11.1

- | Crop | Product |
|---------------|---------|
| 1. (a) → | (b) |

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

Practise Activity 11.2

1. Look and assess the examples of medicinal plants given by the learners and add other information if necessary.
3. Medicinal plants What it cures
3. Garlic – Cure and prevent diabetes, asthma and common cold.
4. Sunflower – Oil used as a lubricant to treat constipation and external wounds for healing.
5. Tumeric – Prevent cancer, prevent heart attack, relief pain, for proper eye vision.
6. Clove oil – Cures athletes foot, ringworm, diarrhoea and relief pain.
7. Straw berry – Leaves are used to treat rashes, diarrhoea, liver diseases and kidney stones.
8. Water lily – Dried roots and leaves are used to treat lung, intestinal and skin diseases.

Practise Activity 11.3

1. (a) → (c)
2. (b) → (d)
3. (c) → (a)
4. (d) → (b)

Possible Answers for Revision Activity 11

Reference: Pupil's Book page 149

1. (a) Ginger
 - Neem powder

(Any other appropriate answer)
2. • Sunflower
- Groundnuts
- Coconut
3. Coffee, tea, cotton, cashew nuts *(Appropriate answers depending on the district)*
4. • Control soil erosion.
- Recycle air through the process of photosynthesis.

- Shelter for wildlife and birds.
(Any other appropriate answer)
5. Trees use carbon dioxide to carry out photosynthesis. They release oxygen which is required by animals and human beings.
 6. (a) Afforestation – This is planting trees where they did not exist.
(b) Deforestation – This is cutting down trees.
(c) Ornamental plants – trees that beautify a place.
 7. (a) Planting trees together with crops.
(b) The trees should have deep roots, should allow light to the crops, should survive regular pruning and should add nutrients to the soil.
(c) This practice ensures production of food, animal feeds and also provide trees for fuel, construction and other uses.
 8. (a) By planting trees. Trees act as wind breaks and help to reduce the bad effects of wind.
(b)
 - Increased soil erosion
 - Destruction of shelter for wildlife
 - Formation of deserts
 9. (a) Food crops are crops/plants grown for consumption (to be eaten).
(b) Food crops grown can vary examples include:
 - Maize • Rice • Beans • Cassava
 - Irish Potatoes • Millet • Bananas • Sweet potatoes
 10. Importance of
 - (a) Trees to domestic animals include:
 - Shade • Sheds or shelters are made from trees
 - Cleaning the air • Some are sources of food to animals
 - (b) Wild animals
 - Source of food • Shelter • Hiding place
 11.
 - Dig a hole to the desired depth.
 - Mix manure and with soil dug up from the hole.
 - Plant your tree seedling to the same depth it was in the nursery seedbed.
 - Compact the soil around the seedling.
 - Apply some mulch then water it.
 - Put a fence around it to protect it from animals (leave the top open to let sunlight in).

Answers to Remedial, Consolidation and Extension Activities

(a) Remedial Activity

1. Afforestation
2. (b) Dry river beds

(b) Consolidation Activity

1. (i) Improves weather conditions of a place.
(ii) Control soil erosion.
(iii) Recycle air through photosynthesis
(iv) Shelter for wildlife and birds.
2.
 - Trees beautify a place.
 - They can be used as firewood.
 - They provide fruits.

(c) Extension Activity

- Grass
- Corn (maize) plant
- *(Any other relevant answer)*

Causes of deforestation

- Creation of agricultural land.
- Creation of homes for settlement.
- Construction and expansion of roads, towns and cities.
- Commercial use of trees such as for making paper, making timber and making posts.

Effects of deforestation

- Climates
- Destruction of animal habitats.
- Increased soil erosion.
- Extinction of some plants.

Preventing deforestation

- Recycling of waste paper.
- When you cut a tree replace it.
- Government to regulate harvesting of trees.
- Using existing trees properly.
(Any other relevant answer)

Topic Area: Human Body

UNIT 12 : DIGESTIVE SYSTEM

Number of periods: 10

Key Unit Competency:

By the end of the lesson, the learner should be able to explain different stages of digestion and prepare a balanced diet.

Background Information

The human body is made up of many systems. A system is a group of glands and organs that work together to perform one function. Examples of systems in our bodies include the breathing system, the digestive system, the reproductive system.

Learning Objectives:

1. Knowledge and Understanding

- Identify major parts of the digestive system and explain their functions.
- Explain the stages of digestion.
- Keep the digestive system healthy.
- Identify components and elements of a balanced diet.
- State nutritional deficiency diseases and discuss how to prevent them.

2. Skills

- Recognize parts of the digestive system and their function
- Discuss stages of digestion
- Apply knowledge to practice of digestive system
- Prepare a balanced diet
- Recognise nutritional deficiency diseases.

3. Attitudes and Values

- Appreciate the importance of eating a balanced diet in order to keep the digestive system healthy.
- Develop the habit of chewing food properly as a way to take care of the digestive system.
- Develop the habit of preparing and eating a balanced diet to prevent nutritional deficiency diseases.

Summary Table of Lessons

Lesson	Content	Learner's Activities
1 Parts and function of digestion	<ul style="list-style-type: none"> • Parts of the digestive system: digestive glands and alimentary canal. • Functions of the digestive system. 	<ul style="list-style-type: none"> • Draw a picture of the digestive system • Label parts of the digestive system.
2 Stages of Digestion	<ul style="list-style-type: none"> • Ingestion • Digestion 	<ul style="list-style-type: none"> • Discuss the digestion process • Name the stages of digestion.
3 Stages of Digestion	<ul style="list-style-type: none"> • Absorption • Egestion 	Explain how to facilitate own digestion.
4 Hygiene of digestion	Practises that help to maintain the hygiene of the digestive system.	<ul style="list-style-type: none"> • Practise proper hygiene of the digestive system. • Maintain the hygiene of the digestive system.
5 Components of a balanced diet	Identifying components of a balanced diet,	<ul style="list-style-type: none"> • Collect various groups of food. • Identify components of a balanced diet.
6 Components of a balanced diet	Preparing a balanced diet.	<ul style="list-style-type: none"> • Prepare a balanced diet. • Eat a balanced diet.
7 Nutritional Deficiency Diseases	<ul style="list-style-type: none"> • Kwashiorkor • Marasmus • Goitre 	<ul style="list-style-type: none"> • Recognise nutritional deficiency diseases. • Observe and identify pictures of people suffering from nutritional deficiency diseases.
8 Nutritional Deficiency Diseases	<ul style="list-style-type: none"> • Rickets • Anaemia • Prevention of nutritional deficiency diseases. 	Prevent nutritional deficiency diseases.
9 Evaluation	Revision Activity 12	Answer theory questions in Revision Activity 12

10 Evaluation	Revision Activity 12	<ul style="list-style-type: none"> • Prepare a balanced diet. • Practice proper hygiene of the digestive system.
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Cross-cutting Issues

(i) *Financial Education*

Let learners understand that the food we eat is bought or grown and it is expensive. Therefore they should not waste food. They should also practise proper hygiene of the digestive system in order to prevent diseases and disorders of the digestive system. It is better to eat a healthy balanced diet than to eat unhealthy food and end up in hospital. When someone goes to the hospital he or she will be charged money. In addition to this productive hours of working are lost when someone becomes ill.

(ii) *Inclusive Education*

Learners should be made aware of the need to have a balanced diet so as to avoid diseases such as rickets, marasmus etc. Rickets can lead to deformities while marasmus and Kwashiorkor can cause mental retardation. Encourage them to appreciate and assist their peers who might be physically disabled.

(iii) *Peace and Values Education*

Allow learners to talk about their experiences of food in groups. Let them discuss the food diversities in Rwanda. Let them also prepare food in groups of their own choice. As they carry out these chores let them divide the roles of acquiring the foods and preparing the foods by themselves. All these will ensure their peaceful coexistence,

(iv) *Gender Education*

Give the learner tasks of preparing food and collecting food equally to all learners regardless of their sex. Let boys collect materials for cooking and cook as well. Boys and girls should be assigned equal tasks.

12.1: Parts and Functions of the Digestive System

Number of periods: 2

Reference: Pupil's Book page 152, Internet, XO laptop and relevant textbooks.

Learning Objectives

By the end of the lesson, the learner should be able to

Knowledge and understanding

Identify major parts of the digestive system and explain their functions.

Skills

- Drawing the digestive system.
- Naming the major parts of the digestive system.

Attitudes and Values

Appreciate the need to have a digestive system.

Learning/Teaching Methods

- Group activity
- Observation
- Drawing

Learning/Teaching Materials

- Chart pictures
- Drawing in Pupil's Book
- Real objects (learners in class)
- Blackboard

Learning Activity

Identify parts of the digestive system and their functions.

Lesson Preparation

Collect required learning resources and take them to class.

Learning/Teaching Steps

- (i) Ask learners to discuss in pairs the pictures in Pupil's Book page 152.
- (ii) Probe them to give correct description as well as predict what they are going to learn in the unit.
- (ii) Ask learners to sit in pairs. Let each learner ask their partner to describe the movement of food from the mouth to the anus.
- (iii) Let them touch their body to demonstrate movement of food along the digestive system.
- (iv) Display the wall chart of the digestive system.
- (v) Ask them to draw it in their notebooks and name the parts they know.

Assessment

- Listen to the learners as they describe the movement of food.
- Evaluate if they know food moves from the mouth to the anus.
- Mark the digestive system they have drawn.

12.2: Stages of Digestion

Number of periods: 1

Reference: Pupil's Book page 154, Internet, XO laptop and relevant textbooks.

Learning Objectives

By the end of the lesson, the learner should be able to

Knowledge and understanding

Explain the stages of digestion.

Skills

- Identifying stages of digestion.
- Observation.

Attitudes and Values

- Curiosity
- Co-operation
- Self-esteem

Learning/Teaching Methods

- Observation
- Discussion
- Question and answer
- Group work

Learning/Teaching Materials

- Charts
- Real objects (pupils in class)
- Picture in books
- Blackboard

Learning Activity

Observing the digestive system and discussing on the digestion process

Lesson Preparation

Ensure all learning resources are available

Learning/Teaching Steps

- Ask the learners to look at the digestive system that they have drawn in their notebooks.
- Guide them on how to label the parts that they have not labelled.
- Ask the learners to sit in their working groups and discuss the digestion process.
- Let each one of them describe how they can help their own digestion.
- Summarize by explaining the digestion process.

Assessment

Check learners confidence and communication abilities.

12.3: Hygiene of Digestion

Number of periods: 1

Reference: Pupil's Book page 156, Internet, XO laptop and relevant textbooks.

Learning Objectives

By the end of the lesson, the learner should be able to keep their digestive system healthy.

Skills

- Keep the digestive system healthy
- Research
- Designing posters

Attitudes and Values

- Care for the digestive system.
- Be cautious while eating different types of food.

Learning/Teaching Methods

- Observation
- Discussion
- Research
- Question and answers

Learning/Teaching Materials

- Charts
- Pictures
- XO browser
- Library books
- Manila paper
- Pens

Learning Activity

Keep the digestive system healthy.

Learning/Teaching Steps

- (i) Ask learners to collect materials needed for the lesson.
- (ii) They also have to use their browser or books in the library to research ways of keeping the digestive system healthy.
- (iii) Allow the learners to discuss in their groups how to keep the digestive system healthy.
- (iv) Let them write notes in their notebooks.
- (v) Share with other members of the class.
- (vi) Assign them groups to design posters that encourage healthy digestive system.
- (vii) Let them hang the posters at the back of their class.

Assessment

- Appraise those who have designed good posters.
- Award them marks.

12.4: Components of a Balanced Diet

Number of periods: 2

Reference: Pupil's Book page 159, Internet, XO laptop and relevant textbooks.

Learning Objectives

By the end of the lesson, the learner should be able to:

- Identify the components and elements of a balanced diet.
- Prepare a balanced diet.

Skills

- Manipulation.
- Creative thinking.
- Recognise benefits of a balanced diet.

Attitudes and Values

- Appreciating the need to eat a balanced diet.
- Desire to eat a balanced diet.
- Co-operation.

Learning/Teaching Methods

- Questions and answers
- Discussion
- Observation
- Manipulation

Learning/Teaching Materials

- Real objects e.g. beans, maize, fruits, potatoes, water,
- Charts
- Pupil's books
- Pictures
- Pens
- Notebooks

Learning Activity

- Collecting various groups of food and identifying them.
- Preparing a balanced diet.

Lesson Preparation

Ask learners to collect different types of food over the weekend and bring them to class.

Learning/Teaching Steps

- (i) Assign them working groups. Let them present all the foods they have collected on the table.
- (ii) Ask them to list in their notebooks the types of foods they have collected.
- (iii) Tell them to draw the table on Pupil's Book page 158 in their notebooks. Allow them to place each food in Activity 12.5 in its correct group.
- (iv) Discuss the various components of a balanced diet as outlined on pages 159 - 160.
- (v) Go round ensuring that learners have grouped various foods in their correct groups to make a balanced diet.
- (vi) Ask them to place the food that they brought to class into their correct food groups.
- (vi) Using the table they have made to guide them on how to prepare a balanced diet.
- (vii) Warn them to be careful while using fire as it can burn them.
- (viii) Let them practise good food hygiene when serving and eating their food.

Assessment

- Assess the learning participation and record it in the rag table by observing the way they group the food correctly and preparing a balanced diet.
- Let them read the story in Pupil's Book page 160 and answer questions as class work.

12.5: Nutrition Deficiency Diseases and their Prevention

Number of periods: 2

Reference: Pupil's Book page 163, Internet, XO laptop and relevant textbooks.

Learning Objectives

By the end of the lesson, the learner should be able to:

Knowledge and understanding

- State nutritional deficiency diseases.
- Say how to prevent nutritional deficiency diseases.
- Prevent nutritional deficiency diseases.

Skills

- Observation
- Manipulation
- Problem solving

Attitudes and Values

- Effective communication.

- Self awareness.
- Working with others.
- Show concern for their health.

Learning/Teaching Methods

- Observation
- Questions and answers
- Discussion
- Note making

Learning/Teaching Materials

- Charts
- Photographs
- Pictures
- Drawings in pupils books
- XO laptop

Learning Activity

Observing and discussing about children suffering from deficiency diseases.

Learning Preparation

Ask the learners to research in the library or using their XO internet about “common nutritional diseases”

Learning/Teaching Steps

- Ask learners to sit in their working groups.
- Allow learners to discuss pictures, photographs and charts displayed.
- Let them make comments on general signs and symptoms of deficiency diseases then presenting to the other members of the class.
- Explain to them the various nutritional diseases and their prevention.
- Allow them to write in their notebooks ways to prevent each deficiency diseases identified.
- Let them give their notes for marking.

Assessment

Mark their books and award them marks.

(a) Remedial Activity

- Ask learners to draw and label parts of the digestive system.
- Learners to say aloud the parts of the digestive system pointed by the teacher using a model/chart. Learner to briefly describe their functions.
- Learners to identify examples of types of food and the deficiency diseases demonstrated in pictures/charts or real items.
- Use multiple choice questions and filling in gap questions to check on the mastering of content taught.

Examples of Questions

1. The following types of food are important in preventing anaemia EXCEPT _____.
(a) Liver (b) Milk (c) Spinach (d) Kidney.
2. Digestion starts in the _____ and ends in the anus. (stomach, mouth)
3. Fruits and vegetables are _____. (carbohydrates, proteins, vitamins)

(b) Consolidation Activity

- Allow learners to discuss in groups the parts and functions of the digestive system using a model. The group leader to present their findings.
- Give learners groups of food substances and let them classify them in groups of proteins, carbohydrates, vitamins.
- Learners to discuss in groups on hygiene of digestion.
- Oral questions and structured questions to be used to recap the content taught.

Examples of Questions

1. Draw digestive system and name the parts.
2. Give two examples of food rich in proteins.
3. Describe briefly how you can prevent kwashiorkor.

(c) Extension Activity

- Ask learners to draw and label major parts of the digestive system.
- Allow learners to describe the digestion process briefly using short sentences.
- Give learners a list of foods for them to classify into their correct food groups.
- Ask learners to write short essays on causes of deficiency diseases and possible ways of preventing them.

Examples of Questions

1. Describe briefly how digestion takes place in the ileum.
2. Name three types of mineral nutrients.
3. Write down three signs of a person suffering from anaemia.

Answers to Practice Activities 12.1

1. Dehydration
2. Digestion, absorption of food.
3. Constipation

Possible Answers for Revision Activity 12

Number of periods: 2

Reference: Pupil's Book page 165 and 166

1. (a) Digestion – this is the process by which food is broken down into smaller particles.
(b) Absorption – is the uptake of digested food into the body.
(c) Ingestion – when food enters the body through the mouth.
(d) Egestion – this is the removal of the undigested food materials from the body.
2. Draw parts of the digestive system.
(See *Pupil's Book page 153*)
3. Mark learners sentences based on correct use of grammar, factual information etc. for example:
 - The alimentary canal is a long tube.
 - The gall bladder produces bile.
4.
 - Gastric glands
 - Saliva glands
5.
 - Eat well cooked food.
 - Always eat plenty of fruits and vegetables.
 - Drink well boiled or treated water.
 - Avoid eating of raw or uncooked food.
 - Wash all foods eaten raw thoroughly with clean water.
 - Limit eating fatty and sugary foods.
6. (a) Vitamins
(b) Carbohydrates
(c) Proteins
7. (a) Kwashiorkor
(b) iron
8. (a) Rickets
(b)
 - Feed the children with food rich in vitamin D and phosphorus.
 - Expose babies to morning and evening sunlight.
(c) Sea fish, crabs, taking iodized salt in food.

9.

Meal	Foods		
Breakfast	Milk	Orange	Arrowroots
Lunch	fish	Spinach	Green grams
Dinner	Beans	Mangoes	Rice

Mark any other relevant answer.

10.
 - She/he can prepare simple meals when left alone at home.
 - He/she knows how to prepare balanced meals.
 - It encourages a child to try out new foods.

(Any other relevant answer)
11. Supervise learners activities. Award marks for safe handling of fire, proper preparation of food and observation of good hygiene practices during serving of food.

Answers to Remedial, Consolidation and Extension Activities

(a) Remedial Activity

1. Milk
2. Mouth
3. Constipation

(b) Consolidation Activity

1. Figure digestive system
2.
 - Fish
 - Beans and any other relevant answer.
3. (i) Children should be breast fed up to 2 or 3 years.
(ii) Weaning foods should constitute a balanced diet with lots of proteins.
(iii) Children should be provided with food rich in proteins

(c) Extension Activity

1.
 - As food leaves the stomach, it enters the upper part of the ileum know as the duodenum. Bile and pancreatic juices mix with food here.
 - Bile is produced by the liver and stored in the gall bladder. Pancreatic juice is produced by the pancreas. it helps in further digestion of food.
 - Digested food is absorbed in the ileum and taken to the blood stream.
2.
 - Calcium
 - Iron
 - Phosphorous and any other relevant answer.
3.
 - Pale skin
 - Loss of appetite and general body weakness.
 - Short of breath and dizziness.

Topic Area: The Human Body

UNIT 13 : REPRODUCTIVE SYSTEM

Number of periods: 20

Key Unit Competency

By the end of the unit the learners should be able to keep their bodies clean and be able to recognise the sexual characteristics of male and females. They should know how to behave responsibly.

Background Information

Sex education is considered to be sensitive topic, the teacher needs to research properly in order to teach this topic effectively. It is very important to understand that some pupils are in puberty, they may have many changes occurring in their bodies. These changes can affect their behaviour. The teacher should know how to handle them well.

Learning Objectives

1. Knowledge and Understanding

- Explain the functions of the human reproductive system.
- Identify the organs of the human reproductive system.
- Explain the function of human genital organs.
- Explain how to practise hygiene of the genital organs.
- Identify sexual characteristics and changes that occur at puberty
- Identify responsible sexual behaviour.

2. Skills

- Practise adequately hygiene of the external organs.
- Recognise sexual characteristics and practise the principles of responsible behaviour.

3. Attitudes and Values

- Show concern to care for genital organs in order to prevent diseases.
- Appreciate the importance of talking about questions related to genital organs.
- Be aware of his /her sexual characteristics and changes at puberty and know how to practise responsible sexual behaviour.

Summary Table of Lessons

Lesson	Content	Learner's Activities
1 Human reproductive system.	<ul style="list-style-type: none"> Identify functions of human reproductive system. Male reproductive (external) organs. 	<ul style="list-style-type: none"> Identify parts of the human reproductive system. Identify the uses of reproduction. Discuss the external parts of the male reproductive organs.
2 Human reproductive system.	Female reproductive (external) organs.	Discuss the external parts of the female reproductive organs.
3 Hygiene of the female genital organs	Hygiene of the female genital organs.	<ul style="list-style-type: none"> Describe how to clean the reproductive organs.
4 Hygiene of the female genital organs	Hygiene of the female genital organs.	<ul style="list-style-type: none"> Explain the importance of maintaining proper hygiene of the sexual organs.
5 Hygiene of the male genital organs	Hygiene of the male genital organs.	<ul style="list-style-type: none"> Describe how to clean the reproductive organs.
6 Hygiene of the male genital organs	Hygiene of the male genital organs.	<ul style="list-style-type: none"> Explain the importance of maintaining proper hygiene of the sexual organs.
7 Sexual characteristics at puberty	Secondary sexual changes in girls.	Identify physical changes that take place in girls during puberty.
8 Sexual characteristics at puberty	Secondary sexual changes in girls.	Discuss physical changes that take place in girls during puberty.
9 Sexual characteristics at puberty	Secondary sexual changes in boys	Identify physical changes that take place in boys during puberty.
10 Sexual characteristics at puberty	Secondary sexual changes in boys	Discuss physical changes that take place in boys during puberty.
11 Puberty	Puberty characteristics in girls.	<ul style="list-style-type: none"> Discuss why it is important to feel comfortable touching your own genitals.

12 Puberty	Puberty characteristics in girls.	• Discuss puberty characteristics in girls.
13 Puberty	Puberty characteristics in boys.	• Discuss why it is important to feel comfortable touching your own genitals.
14 Puberty	Puberty characteristics in boys.	• Discuss puberty characteristics in boys.
15 Safe responsible behaviour	Identify safe responsible behaviour.	Identifying safe responsible behaviour and unsafe behaviour.
16 Safe responsible behaviour	Practising safe responsible behaviour.	Discussing and practising safe responsible behaviour.
17 Safe responsible behaviour	Love and infatuation.	• Discuss difference between love and infatuation.
18 Safe responsible behaviour	Love and infatuation.	• Dramatisation of love and infatuation game.
19 Evaluation	Revision Activity 13	Answers questions in Revision Activity 13.
20 Evaluation	Revision Activity 13	• Practise responsible sexual behaviour. • Make informed decisions.

Cross-cutting Issues

(i) Gender Education

The learners should be able to appreciate the opposite gender. Advise them how to cope with changes that take place in their bodies. The teacher should inculcate positive values to the learners. The learners should see these changes positively.

(ii) Comprehensive sexuality education

HIV/AIDS is spreading fast especially among adolescents and the youth. They should practise responsible sexual behaviour cases and teenage pregnancies are also common.

Emphasize that abstinence is the most effective way of avoiding infections and early pregnancies. The learners should show positive behaviour change.

(iii) Inclusive Education

People of all status, able bodied and disabled are affected by physical changes.

The disabled learners should also be made to understand that they too will undergo similar changes. Should be engaged in positive discussions.

(iv) Peace and values education

When the learners understand that the changes in them are the same for everyone, they will not make fun of each other. This helps to promote positive coexistence among them. This should bring harmony and friendly relationships.

Notes to the teacher

The most common way through which HIV/AIDS is spread is through sexual intercourse. The learners should be counselled not to indulge in sex before marriage. HIV destroys the body's immunity making the person weak and unproductive.

The teacher should remind learners that relationships between boys and girls can be platonic. It should not necessarily be sexual. The teacher should also remind the learners to appreciate and help people with HIV/AIDS to avoid stigma.

13.1: Human Reproductive System

Number of periods: 4

Reference: Pupil's Book page 169 and Internet.

Learning Objectives

By the end of this lesson, the learners should be able to give the functions of the male and female reproductive systems.

Skills

The learners should be able to recognise the male and female reproductive system.

Attitudes and Values

Show concern to care for the genital organs.

Learning/Teaching Methods

- Questions and answers
- Discussion
- Observation
- Group discussion

Learning/Teaching Materials

- Charts, Picture in pupils books, Internet, Relevant textbooks, Models

Learning Activities

Human reproductive system.

Lesson Preparation

- Read the content in the learners books and other relevant texts by the teacher before the lesson.

- Obtain the relevant charts, models and pictures.

Teaching/Learning Steps

- (i) Ask learners to observe introductory pictures in Pupil's Book page 168. Let them discuss in pairs and predict what is to be learnt in the unit.
- (ii) Let the learners to name some parts of their bodies. Encourage them to name reproductive parts well.
- (iii) Ask learners to give the functions of some body parts.
- (iv) Lead the learners in the discussion of the male and female reproductive system.
- (iv) Display charts and pictures of male and female reproductive organs. Let learners observe and identify the external parts of the reproductive systems.

Assessment

Assess learners' ability to:

- Explain the functions of the human reproductive system.
- Draw and label external parts of the male and female reproductive system.
- Explain the functions of the male and female genital organs.

13.2: Hygiene of the Female and Male Genital Organs

Number of periods: 4

Reference: Pupil's Book page 171 and Internet.

Learning Objectives

By the end of this lesson, the learners should be able to explain how to maintain the hygiene of male and female reproductive organs.

Skills

- Practise cleaning and hygiene of external organs.

Attitude and Values

- Show concern to care for the genital organs.

Attitudes and Values

The learner to develop care and appreciation of the genital organs.

Learning/Teaching Methods

- Brainstorming
- Questions and answers
- Discussions
- Practical activity

Learning/Teaching Materials

- Charts
- Models
- Picture
- No computers

Learning Activity

Hygiene of the female and male reproductive organs.

Lesson Preparation

Obtain the necessary materials for this lesson before the lesson.

Learning/Teaching Steps

- (i) Group the learners according to their gender (in groups of 5).
- (ii) Provide learners with sanitary pads, underwear, soap and water.
- (iii) Let learners of one gender discuss how they practice hygiene of their genital organs.
- (iv) Ask learners to practise sticking pads on the underwear.
- (v) Demonstrate how underwear should be washed and stored.
- (vi) Let all learners practise washing and keeping the underwear properly.
- (vii) Let learners explain how the opposite gender practices hygiene of their genitals.
- (viii) Allow learners to discuss how the materials provided (sanitary pads, soap, underwear) relate to their hygiene and that of their opposite gender.
- (ix) Let them write short notes in their notebooks.

Assessment

- Assess learners' ability to clean their underwear using soap and water.
- Assess learners' ability to explain how to practice hygiene of genital organs.

13.3: Sexual Characteristics at Puberty

Number of periods: 3

Reference: Pupil's Book page 171 and Internet.

Learning Objectives

By the end of this lesson, the learners should be able to identify sexual characteristics at puberty.

Skills

Recognize sexual characteristics at puberty as a way to practice principles of responsible sexual behaviour.

Attitudes and Values

- Appreciate the importance of talking about changes at puberty.
- Show concern to care for genital organs.

Learning/Teaching Materials

- Charts
- Illustrations
- Pictures
- Models

Learning/Teaching Methods

- Group activity
- Discussion
- Class activity
- Questions and answers

Learning Activity

- Sexual characteristics at puberty.
- Lesson preparation.
- Read the content in the learners book before the lesson.
- Familiarise yourself with sexual changes at puberty.

Lesson Preparation

- Read the content in Pupil's Book page 171.
- Obtain the necessary pictures and charts for the lesson.

Learning/Teaching Steps

- Let learners discuss Activity 13.3 in groups. Assess their work.
- Let learners to observe pictures on secondary sexual changes in boys and girls in the Pupils' Book page 172 – 174. Ask learners to do Activities 13.4 and 13.5 individually go round marking their responses.
- Ask learners to describe the secondary sexual changes observed in boys and girls from the pictures.
- Let learners describe characteristics that are specific to boys and girls.
- Ask learners to read aloud the short stories in Pupils' Book pages 173, 175 on secondary changes in both boys and girls.
- Put learners in groups of 5 and let them discuss and identify the sexual characteristics taking place in boys and girls during puberty.
- Provide additional information that learners have not discussed.

Assessment

Find out if the pupils can write down the changes that occur during puberty. Write them in a table as shown below.

Changes in boys	Changes in girls

13.5: Safe Responsible Behaviour

Number of periods: 4

Reference: Pupil's Book page 177 and XO laptop

Learning Objectives

By the end of the lessons, the learners should be able to explain responsible sexual behaviour.

Skills

Practise the principles of responsible sexual behaviour.

Attitude and Values

Be aware of responsible sexual behaviour.

Learning/Teaching Methods

- Discussion.
- Demonstration.
- Practical activity.
- Role play.

Learning/Teaching Materials

- Charts.
- Pictures.
- Internet.
- Magazines.

Learning Activity

Responsible and safe behaviour

Lesson Preparation

- Read the content in the Pupil's Book page 177 before the lesson.
- Guide the learners to find out some safe and responsible sexual behaviour for the lesson.

Learning/Teaching Steps

- (i) Introduce the lessons through probing questions on acceptable behaviour in the society and risky behaviour.
- (ii) Let learners to read the story in Activity 13.7 page 177. Allow them to discuss the story. Let them answer the questions given individually, then present their answers in groups.
- (iii) Built on the responses from the story to enlighten learners about responsible behaviour.
- (iv) Discuss content in pages 178 - 179 as a class. Get learners involved in the discussions. Allow presentation of educative case studies.
- (v) Ask learners to make short notes on the sub-topic. Mark learners notes.

Assessment

- Observe behaviour change in daily life.
- Make class presentations on responsible behaviour.

Teachers note

Guidelines on Activity 13.8.

Before learners display their choices give them time to interact with the content.

Answers

Love	Infatuation
(ii), (iii), (vi)	(i), (iv), (v) and (vii)

(a) Remedial Activity

- Using charts with unlabelled pictures ask learners to identify by saying aloud the parts of the male and female reproductive system.
- Provide pictures that are partially labelled for learners to complete.

Example of Questions

1. External parts of males: P _ n _ _
 2. External parts of females: Mo _ _ P _ b _ _
- Give 'Yes' and 'No' questions to help learners understand hygiene of male and female genital organs.
 - Provide pictures/pictures of male and female for learners to observe and identify changes during puberty.
 - Allow learners to read customised short stories on responsible behaviour.
 - Give learners leading questions for them to answer orally e.g.
3. The urethra allows _____ and _____ to pass through it.

(b) Consolidation Activity

- Give pictures for male and female reproductive systems for learners to label the major parts.
- Give tables to be filled in by the individual learners after discussion in groups.

Example of Questions

1.

Hygiene of female genitals	Hygiene of male genitals
1. _____	1. _____
2. _____	2. _____
3. _____	3. _____
4. _____	4. _____
5. _____	5. _____

- Provide charts for learners to identify parts of the male and female anatomy that are similar.

2.

Female organ	Male organ
Clitoris	Penis
Ovary	Testis
_____	_____

(c) Extension Activity

Discuss and identify other safe responsible behaviour with your parents at home and list to them down.

Answers to Practice Activities 13.3

1. B. They are playing in the field while A are playing on the road.
2.
 - Premarital sex
 - Fighting
 - Truancy
 - Tobacco smoking
 (Any other relevant answer)
3.
 - Self discipline
 - Well organised
 - Responsible
 - Has respect
 (Any other relevant answer).

Possible Answers for Revision Activity 13

Number of periods: 2

Reference: Pupil's Book page 180

1. Reproduction is the process of giving rise to young ones.
2. (a) Penis (b) Scrotum
(c) Labia majora (d) Labia minora
3. **Females**
 - Bathing regularly with soap and water.
 - Change into clean clothes after bathing.

- Wipe the genitals with tissue paper after urinating.

Males

- Bathing regularly with soap and water.
 - Change into clean clothes after bathing.
 - Visit the hospital in case of abnormal discharge or rashes.
 - *(Mark any other relevant answers).*
4.
 - Fighting
 - Stealing
 - Use of drugs
 - Irresponsible sexual behaviour
 5. Irresponsible sexual behaviour can lead to:
 - Rejection by family members
 - Unwanted pregnancies
 - School dropouts
 - Contracting sexually transmitted diseases
 6. Social and emotional changes occur at puberty. Some
 - Social changes are brought about by societal structure or outlook for example social changes, searching for identity, seeking for independence and influence by friends.
 - Are brought about by hormonal changes.
 7. (a) Avoid risky behaviour.
 (b) Suffer from guilt, they can be caught and be punished, embarrassment.
 (c) A good friend. He gives good advice.
 - 8.

Boys	Girls
<ul style="list-style-type: none"> • Broadening of shoulders. • Breaking of voice. • Wet dreams. 	<ul style="list-style-type: none"> • Enlargement of breasts. • Menstruation. • Widening of hips.

9. (a) Puberty is a stage where a boy or a girl becomes sexually mature and is able to reproduce.
 (b) It prepares boys and girls physically and sexually for reproduction.
10. (a) Maintain proper hygiene, Wash clothes regularly, Shave/trim hair under the armpits.

- (b) We can choose good friends by:
- Observing their behaviour.
 - Chasing friends who promote positive values.
 - Avoiding manipulative people.
 - Choose supportive people.
 - (*any relevant answers*)
11. • Politely declining the advance to avoid hurting him/her.
- Tell your classmate that it is wrong to write love letters.
 - Seek guidance and counselling from trusted friend.
 - Report to a responsible adult if he or she persists.

Answers to Remedial, Consolidation and Extension Activities

(a) Remedial Activity

1. Penis
2. Mons pubis
 - Sperms and urine

(b) Consolidation Activity

1.

Hygiene of female genitals	Hygiene of male genitals
<ol style="list-style-type: none"> 1. Bath regularly. 2. Change into clean underwear. 3. Wipe genitals. 4. Do not insert objects into vagina. 5. Visit the doctor incase of abnormal discharge. 	<ul style="list-style-type: none"> • Bath regularly. • Wear clean underwear. • Shake penis gently after urinating. • Uncircumcised boys clean the area under foreskin. • Seek medial attention incase of abnormal discharge.

2.

Female organ	Male organ
Vaginal opening	urethra opening

Topic Area: Energy

UNIT 14

:

LIGHT

Number of periods: 7

Key Unit Competency

By the end of the lesson, the learner should be able to demonstrate the existence of light, explore its properties and transmission according to its intensity.

Background Information

Light is a form of energy that enables us to see various objects. The main source of light on earth is the sun. We have other sources of light e.g. fire, lamp, torch, candle.

Learning Objectives

1. Knowledge and Understanding

- Discuss and explain propagation of light.
- Demonstrate the transmission of light.
- Design an experiment to show reflection and refraction of light.

2. Skills

- Observe light propagation.
- Perform experiments to show transmission of light.
- Practise the properties of light using water and a plane mirror.

3. Attitudes and Values

- Pay attention to propagation of light.
- Classify materials according to light intensity.
- Visit different areas to find reflection and refraction in nature.

Summary Table of Lessons

Lesson	Content	Learner's Activities
1 Light propagation	How light moves from one place to another.	<ul style="list-style-type: none">• Investigating how light travels.• Observing how light travels in a straight line.
2 Medium of light transmission	<ul style="list-style-type: none">• Transparent medium• Translucent medium• Opaque medium	<ul style="list-style-type: none">• Investigate how light travels in different media.• Demonstrate light transmission.• Classify materials according to how much light passes through them.

3 Laws of light propagation	Reflection of light	Experiment how reflection and refraction of light occurs
4 Laws of light propagation	Refraction of light	Find out application of reflection and refraction in real life.
5 Evaluation	Revision Activity 14	Answer questions in Revision Activity 14.
6 Evaluation	Revision Activity 14	Investigate properties of light using water and plane mirrors .

Cross-cutting Issues

(i) Financial Education

Light is important in our life. Without light there is no life. We should appreciate that God has given the sun as our main source of light. However, sun alone cannot provide light especially at night. We need light at night. The teacher should let learners know that we need money to install electricity. We can use, other sources of light like lamps, torches and candles. Caution the learners to take care and conserve light as it is expensive.

(ii) Inclusive Education

All learners despite their disabilities should be involved in various learning activities. Learners with disabilities should be assigned those duties they can handle in their groups.

(iii) Gender Education

Girls and boys should be distributed equally in class groups. When sharing duties in groups, share them equally between boys and girls.

Notes to the teacher

How to deal with learners with physical disabilities

Handling Fast Learners

- Give them more work in addition to normal class tasks.
- For revision activities assign them more application questions for them to think.

Handling slow learners

- Give them work in pairs or groups where there are fast learners. Encourage them to participate actively in those groups.

Handling mentally challenged learners

- Pupils with learning difficulties should be provided with real objects and pictures made in different shapes and decorated with attractive colours.

- These materials should be pitched to their ability levels.
- Learners who cannot see can be provided with tactile materials done in Braille and real materials.
- Create a learning atmosphere that helps and interacts with the disabled learners.

14.1: Light Propagation

Number of periods: 2

References:

- Pupil's Book page 183
- Internet
- Relevant textbooks

Learning Objectives

By the end of the lesson, the learner should be able to

Knowledge

Discuss and explain propagation of light.

Skills

- Investigate how light travels.
- Manipulation.
- Creative thinking.
- Effective communication.

Attitudes and Values

- Responsibility
- Confidence
- Working in groups

Learning/Teaching Methods

- Observation
- Discussion
- Question and answer

Learning/Teaching Materials

- Source of light e.g. candle / torch
- Card board
- Notebooks
- Board
- Pens

Learning Activities

Investigating how light travels

Lesson Preparation

Assemble all the learning materials and come with them to class.

Learning/Teaching Steps

- (i) Put the learners in groups. Tell them to look at introductory pictures on Pupil's Book page 183. Let them describe the pictures as well as predict what they are going to learn in this unit.
- (ii) Display the materials to be used on the table.
- (iii) Demonstrate to them on how to perform the experiment on how light travels.
- (v) Let them write their observations and conclusion in their books.
- (vi) Allow them to compare results and present their findings in class.

Assessment

- Go round observing learners as they carry out the activity. Assess them to know if they have understood the content.

14.2: Medium of Light Transmission

Number of periods: 2

References

- Pupil's Book page 184
- Internet
- Relevant textbooks
- XO laptop

Learning Objective

By the end of the lesson, the learner should be able to:

Knowledge and understanding

Explain transmission of light through various media.

Skills

Demonstrate the transmission of light through different media.

Attitudes and Values

- Self awareness.
- Working with others.
- Effective communication.

Learning/Teaching Methods

- Observation
- Manipulation
- Question and answer
- Discussion

Learning/Teaching Materials

- Real objects e.g. papers (oiled and clear), torch, notebooks
- Charts
- Pictures in pupils books
- Board

Learning Activity

To investigate how light travels through different type of media.

Lesson Preparation

Collect required learning resources and take them to class.

Learning/Teaching Steps

- (i) Assign them into working groups.
- (ii) Display the charts and let them discuss how light travels through different media.
- (iii) Display learning materials to be used on the table.
- (iv) Allow them to carry out Activity 14.2 in Pupil's Book pages 184.
- (v) Let the group secretary record the observations made.
- (vi) Let them share with the rest of the class about the findings and discussion.
- (vii) Allow them to compare their observations with those written in the Pupil's Book page 184. Explain to them how light travels through various media.
- (viii) Give them Activity 14.1 as homework.

Assessment

Assess if learners can investigate and explain how light travels through different media.

14.3: Laws of Propagation

Number of periods: 2

References

- Pupil's Book page 186
- Internet
- Relevant textbooks
- XO laptop

Learning Objectives

By the end of the lesson, the learner should be able to

Knowledge and understanding

Explain the meaning of reflection and refraction of light.

Skills

Design experiments to show reflection and refraction of light.

Attitudes and Values

- Working with others.
- Effective communication.
- Appreciate the benefits of light.

Learning/Teaching Materials

- Mirror, source of light, wall, pencil, ruler, water in a glass
- Charts
- Pictures in pupils books
- Board
- XO laptop.

Learning/Teaching Methods

- Observation
- Group discussions
- Brainstorming
- Experimentation
- Demonstration

Learning Activities

- To demonstrate reflection of light.
- To demonstrate refraction of light.

Lesson Preparation

- Make sure all teaching and learning materials are available.

Learning/Teaching Steps

- (i) Ask learners to get into their working groups.
- (ii) Ask the learners to carry out the experiment on reflection of light following the steps outlined on Pupil's Book page 186. Let them record their observations in their notebooks.
- (iii) Tell them to do the experiment on refraction as outlined in Activity 14.4. Pupil's Book page 188.
- (iv) Let them record their observation in their exercise books.
- (v) Let them search from XO laptop on how reflection and refraction of light takes place. Allow them to discuss their findings.
- (vi) Allow them to share their findings with other groups to see what they have written.

Assessment

Assess learners presentations to find out if they have understood the concept.

(a) Remedial Activity

- Ask learners oral questions for oral answers as they carry out experiments on light.
- Give learners multiple choice questions to help learners recap what they have learnt through out the topic. e.g.
 - Which among the following is a natural way of lighting the house?
 - (a) using skylights
 - (b) Electricity
 - (c) Using hurricane lamps
 - (d) Using candles
- Give learners gap filling questions on light e.g.
 - Light from a torch travels in _____ direction.
- Give pictures or examples of sources of light for them to identify.

Example of Questions

1. Light cannot pass through _____ objects. (transparent, opaque)
2. Light helps us to _____. (walk, see)
3. _____ is bouncing back of light rays. (refraction, reflection)

(b) Consolidation Activity

- Give learners tables and questionnaires for them to fill in as they perform experiments.
- Give learners structured questions and matching items in order for them to understand concept on light propagation, light transmission and laws of propagation.
- Learners to discuss in groups and write down some of the importance of light in our lives.

Example of Questions

1. Define the word propagation.
2. Light is reflected back when light falls on a _____ surface.
3. Draw the two types of rays.

(c) Extension Activity

- Ask learners to research and describe briefly the concepts of light propagation, light transmission and laws of light.
- Ask learners to collect an assortment of various items and classify them as transparent, translucent or opaque materials.
- Ask learners to research and write down application of refraction and reflection of light in our daily life.

- Ask learners to briefly write down in order the steps followed in setting various experiments on light propagation.

Example of Questions

1. List down three transparent materials.
2. name the three medium of light transmission.
3. Why do swimming pools look raised?

Answers to Practice Activity 14.1

1.
 - Comes in various colours and patterns.
 - Enhances privacy and security.
 - Prevents splintering of glass.
 - Prevent damage to the skin by the sun
2.
 - oiled paper
 - some plastics
 - ice
 - tissue paper

Possible Answers for Revision Activity 14

Number of periods: 2

Reference: Pupil's Book page 189 - 190

1. Beam

	Transparent	Translucent	Opaque
2.	Drinking glass	Frosted glass	Stone
	Polythene paper	Oiled window pane	wood

3. (a) Reflection – is the bouncing back of light when it falls on a surface.
(b) Refraction – is the bending of the light ray when it travels from one medium to another different medium.
4.
 - Regular reflection
 - Irregular reflection
5. Observe the following: The learner should put the ruler in water and observe it from above. The learner should report that the ruler appears bent.
Refraction occurs because light travels at different speeds in different media.
6. flat shiny surfaces.
7. (a) Regular reflection.
(b) (i) Incident rays (ii) Refracted rays

8.
 - The floor of swimming pools appearing raised.
 - Formation of a rainbow.
 - Riverbeds appearing shallow.
9. (a) In setup 1, James could see the candle.
In setup 2, Rose could not see the candle.
- (b) Light travels in a straight line.
10. (a) Reflection
- (b) For observation around corners/barriers.
11. (a) Used in making windows, drinking glasses and windscreens.
- (b) Making of frosted glass of bathrooms.
- (c)
 - Making of doors that one cannot see through.
 - Making walls and roofs.

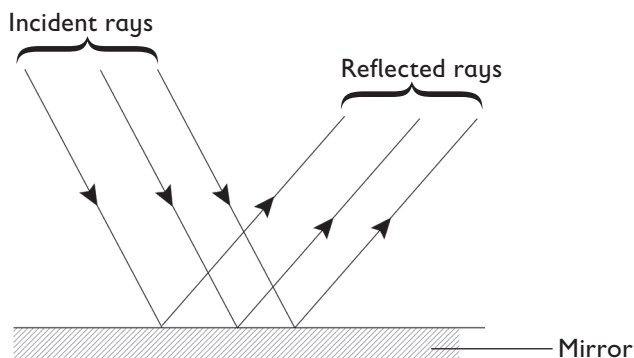
Answers to Remedial, Consolidation and Extension Activities

(a) Remedial Activity

1. Opaque
2. See
3. Reflection

(b) Consolidation Activity

1. To move, spread or travel
2. Smooth shiny
- 3.



(c) Extension Activity

1. Clear water, air, glass window.
2. Transparent, translucent, opaque.
3. Because of the refraction of light at the surface of water.

Topic Area: Energy

UNIT 15

:

ELECTRICITY

Number of periods: 9

Key Unit Competency

By the end of this unit, the learners should be able to construct, manage an electric circuit and explain its importance.

Background Information

Electricity is a form of energy that is used in operating machines, lighting and cooking among many other things. Electricity can be generated from wind, water, diesel and petrol, bicycle dynamo etc. Electricity generated from water is called hydro-electricity. It is transmitted through electric cables to the consumers.

Learning Objectives

1. Knowledge and Understanding

- Explain the importance of producing electricity.
- Identify sources of electricity.
- Identify components of an electric circuit.
- List common tools and materials used in electricity.
- Explain the methods of controlling dangers of electricity.
- Explain dangers of an electric circuit.

2. Skills

- Construct a simple electric circuit.
- Differentiate the components of an electric circuit.
- Manage an electric circuit.

3. Attitudes and Values

- Show concern for the production of electricity.
- Show responsibility for their own safety.
- Justify change along with technological advancement to defend the use of standard electrical components and other electronic equipment.

Summary Table of Lessons

Lesson	Content	Learner's Activities
1 Importance of electricity	Uses of electricity in daily life.	Discuss importance of electricity.
2 Production of electricity	Production of electricity from bicycle dynamo.	Explore the production of electricity from bicycle dynamo.
3 Production of electricity	Production of electricity from solar panel.	Explore the production of electricity from solar panel.
4 Common tools and materials used in electricity	<ul style="list-style-type: none"> • Common tools used in electricity. • Common materials used electricity. 	<ul style="list-style-type: none"> • Identify and name common tools used in electricity. • Identify and name common materials used in electricity.
5 Simple circuit	Constructing simple circuit.	<ul style="list-style-type: none"> • Collecting materials for constructing an electric circuit. • Construct an electric circuit.
6 Simple circuit	Controlling an electric circuit.	Manage an electric circuit.
7 Dangers of electricity	Explain danger of electricity.	Explain methods of controlling the dangers of electricity.
8 Evaluation	Revision Activity 15	Answer theory questions in Revision Activity 15.
9 Evaluation	Revision Activity 15	Answer practical questions on Revision Activities 15.

Cross-cutting Issues

(i) *Environment and Sustainability*

Producing electricity using petrol or diesel generators pollutes the air. Alternative ways such as use of solar panels, wind turbines or water turbines do not pollute the environment these are clean sources of energy.

(ii) *Standardization Culture*

Electrical appliances used in our homes should be of high quality. Low or poor quality appliances can result in fires at home or in hospitals. Good quality appliances last a long time and are safe to use.

(iii) Gender Education

Girls and boys should be fully engaged in the practical activities of this topic. Girls should be given equal opportunities to boys. Encourage free interaction between boys and girls.

(iv) Inclusive Education

Work towards building self esteem in disabled children. Allocate them duties and encourage them to do it to perfection.

Appreciate ideas, coming from disabled children.

(v) Peace and Value Education

Fair distribution of resources brings about sustainable peace. The supply of electricity to homes should be done fairly and equitably. This helps to foster peace and national cohesion.

Notes to the Teacher

An electric current is a flow of electronic charge through a conductor. If the conductor is a metal wire in an electric circuit, then the electronic charge is a flow. A circuit may include components such as a lamp (bulb), a switch and source of electricity. When the bulb lights, the electric energy is changed to heat and light by the bulb. The teacher should allow learners to practice making different types of circuits.

Solar panels converts light energy from the sun to electricity.

15.1: Importance of Electricity

Number of periods: 1

Reference: Pupil's Book page 192 and Internet.

Learning Objectives

By the end of this lesson the learners should be able to:

- Outline the importance of electricity.
- Explain the production of electricity.

Knowledge

Identify the importance of electricity.

Skills

Investigate importance of electricity.

Attitudes and Values

The learners should appreciate and show concern for the production of electricity.

Learning/Teaching Methods

- Discussion
- Practical activity
- Question and answer
- Demonstration
- Field trip

Learning/Teaching Materials

- XO laptop
- Radios
- Bulbs
- Torch
- Charts

Learning/Teaching Steps

- Ask learners to look at introductory pictures in Pupil's Book page 191. Allow them to discuss and predict what they are going to learn in the unit.
- Ask one learner to switch on lights in class. Let other learners put dry cells in a torch and light it. Let another learner connect an XO laptop on electricity and switch it on.
- Ask learners in class to discuss the events in (ii) above.
- Display charts showing uses of electricity. Let them discuss the uses in pairs. Allow them to make short notes.
- Assign the activity 15.1 as class work.
- Go round checking their notes and responses to Activity 15.1.

Assessment

Assign learners' ability to identify and explain the importance of electricity in daily life.

15.2: Production of Electricity

Number of periods: 2

Reference: Pupil's Book 193, XO laptop and other relevant text books.

Learning Objective

By the end of the lesson, the learners should be able to:

Knowledge and understanding

Describe how electricity is produced.

Skills

Produce electricity using a bicycle dynamo and solar panel.

Attitudes and Values

Show concern to the production electricity.

Learning and Teaching Materials

- Dry cells
- Battery
- Bicycle dynamo
- Simple solar panels

Learning Activities

- Producing electricity from bicycle dynamo.
- Field visit to electricity producing plant.

Lesson Preparation

- Acquire the required materials such a solar panel, bulbs, dry cells, battery and wires.
- Obtain the charts and pictures.
- Research on the internet about production of electricity.

Learning/Teaching Steps

- Visit an electricity producing plant.
- Allow learners to ask questions from power plant experts on how electricity is produced. Encourage them to make sketches of the process as well.
- Let learners do Activity 15.3 on page 194 and Activity 15.4 on page 196 in class.
- Supervise their activities and help them where necessary.
- Guide learners to produce electricity using a simple dynamo and simple solar panel as outlined on pages 194 and 195 respectively.
- Allow learners to discuss various ways of producing electricity in their groups.
- Ask learners to make short notes on ways of producing electricity.

Assessment

Assess the learners' ability to:

- Explain ways of producing electricity.
- Produce electricity using solar panels and simple dynamos

15.3: Common Materials and Tools Used in Electricity

Number of periods: 2

Reference: Pupil's Book 197 and Internet.

Learning Objective

By the end of the lesson, the learners should be able to

Knowledge and understanding

List common materials and tools used in electricity.

Skills

Use common tools and materials used in electricity.

Attitudes and Values

Show concern for the materials and tools used in electricity.

Learning/Teaching Methods

- Discussion
- Group activity
- Observation
- Demonstration
- Questions and answers

Learning/Teaching Materials

- Common materials used in electricity.
- Common tools used in electricity.
- Charts and pictures of common electricity tools and materials.

Learning Activity

To investigate how light travels through different type of media.

Lesson Preparation

- Read the content in the Pupil's Book.
- Obtain the necessary materials and tools.
- Research from the internet the uses of these tools and materials.

Learning/Teaching Steps

- Ask learners to study tools in Activity 15.5 and 15.6 on page 197 – 198.
- Ask them to answer questions in the activities individually in their notebooks.
- Display some tools and materials that are available for learners to identify
- Let them identify common tools used in electricity and their uses. Let them also identify common materials used in electricity and their uses.
- Explain to them tools and materials that they do not know.
- Give them exercises to identify common materials and tools used in electricity.

Assessment

Assess the learners' ability to:

- Identify common materials and tools used in electricity.
- Explain uses of some common tools and materials used in electricity.

Answers to Activity 15.6 and 15.7

Common Tools Used in Electricity

- (a) Fish tape (b) Tape measure (c) Circuit tester (d) Ladder
(e) Hammer (f) Wire stripper (g) Electric drill (h) Electrician level
(i) Screw driver (j) Flash light (k) Hack saw

(l) Cutting pliers / side snipes

Common materials Used in Electricity

- | | | | |
|---------------|------------|--------------|---------------|
| (a) Fuse | (b) Socket | (c) Cable | (d) Conductor |
| (e) Conductor | (f) Switch | (g) Dry cell | (h) Screw |
| (i) Bulb | (j) Plug | (k) Adaptor | |

15.4: Controlling Electric Circuit and the Dangers of Electricity

Number of periods: 2

Reference: Pupil's Book page 199 and Internet.

Learning Objectives

By the end of the lesson, the learners should be able to:

Knowledge and Understanding

- Explain methods of controlling electric circuit.
- Explain the dangers of electric circuit.

Skills

- Construct a simple an electric circuit.
- Manage an electric circuit.

Attitudes and Values

Justify change along with technological advancement to defend use of standard electrical components.

Learning/Teaching Materials

- | | | |
|----------------|------------|----------|
| • Screw driver | • Fuse | • Tester |
| • Bulb | • Wires | • Charts |
| • Photographs | • Switches | |

Learning/Teaching Methods

- | | |
|-----------------------|-------------------|
| • Observation | • Group activity |
| • Question and answer | • Experimentation |
| • Demonstration | |

Learning Activities

Controlling electric circuit and changes of electricity.

Lesson Preparation

- Read the content in the pupil's book.
- Visit some electrical installations and observe the warning signs on them.
- Find out the meaning of each of these warning signs.

Learning/Teaching Steps

- (i) Ask learners to attempt practise Activity 15.2 in their notebooks. Mark their work.
- (ii) Ask them to construct a simple electric circuit as shown in Activity 15.7 page 198. Ask them to record their observations.
- (iii) Guide learners to manipulate the circuit they made in Activity 15.8 on page 200 by connecting and disconnecting the switch. Ask them to write their observations as well.
- (v) Ask learners to read the poem on dangers of electricity in Activity 15.9 page 200 in pairs.
- (vi) Let them answer questions individually in their books.
- (vii) Show learners video clips or pictures showing dangers of electricity. Allow them to discuss.
- (viii) Ask learners to make a simple electric circuit as project work.

Assessment

- Assess learners' ability to recognise and draw the warning signs and give the meaning of each sign.
- Write down the safety precautions when using electricity.

(a) Remedial Activity

- Give learners oral questions on some of the uses of electricity.
- Give learners pictures and photographs showing uses of electricity. Ask learners to say the correct answers.
- Give learners multiple choice questions, Yes and No question items and simple incomplete sentences for them to fill in. These are to help them recapture the content covered.

Examples of Questions

1. The following are importance of electricity EXCEPT.
(a) Lighting houses (b) To power electrical gadgets
(c) Communication (d) Used in gas cookers.
2. Solar panels convert _____ energy from the sun to electricity. (heat, light)
3. The path through which electricity flows is know as _____. (electric circuit, electric current)

(b) Consolidation Activity

- Give learners pictures showing uses of electricity, sources of electricity, tools used and materials used in electricity. Give learners pictures showing dangers of electricity as well. Let learners fill in short descriptions concerning the pictures.
- Give learners structured questions, open ended questions and short essay questions to test content taught.
- Give learners practise on constructing simple electric circuit and manage the circuits.
- Give learners table to fill in individually.

Examples of Questions

1.

Material	Function
1. Wire	_____
2. Bulb	_____
3. Dry cell	_____
4. Fuse	_____

(c) Extension Activity

- Let learners draw pictures showing application/uses of electricity with short descriptions of the picture.
- Give learners short essay questions on sources and dangers of electricity.
- Ask learners to write short notes on possible uses of tools and materials used in electricity.
- Learners to draw and label parts of a simple electric circuit.
- Let learners make simple electric circuits.

Examples of Questions

1. How does a car battery produce electricity?
2. Draw a simple circuit and label the components.
3. What is a fuse? What is its importance in an electric circuit?

Answers to Practice Activities 15

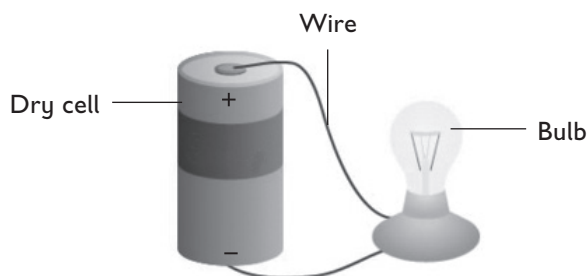
Practice Activity 15.1

1. This is electric energy derived from water falls or fast running water.
2. They are connecting and fixing electric power lines to the poles.
3. (i) Nyabarongo Hydro-Electric Power Station

- (ii) Rukarara Hydro-Electric Power Station
 - (iii) Rusuma Hydro-Electric Power Station
- (And any other relevant answer.)

Practice Activity 15.2

1.



Possible Answers for Revision Activity 15

Number of periods: 2

Reference: Pupil's Book page 202

1. False
2. It will not give light. The circuit is incomplete.
3.
 - Dry cells
 - Solar panel
 - Car battery
 - Diesel or petrol generator (Any other appropriate answer)
4. Solar panel produces electricity by changing light energy from the sun to electricity.
5. (Evaluate learners' work to know if they can draw an electric circuit with two batteries and one bulb correctly)
6.
 - Copper wires
 - Aluminium wires
 - Silver wires (Any other appropriate answer)
7.
 - Do not use electrical appliances with damaged parts.
 - Do not operate electrical appliances with wet hands.
 - Do not overload circuits. (Any other appropriate answer)
8. Dry cells, wires, bulb, bulb holder
9. Add more dry cells
10. (a) The dry cell got used up and lost chemical energy.

- (b) Put a switch to the circuit and control the flow of electricity in the electric circuit.
11. (a) Radio, refrigerator, television, electric iron
(Any other appropriate answer)
- (b) It can cause electric shock or fire.
- (c) • Avoid using it.
• Take it for repair.

Answers to Remedial, Consolidation and Extension Activities

(a) Remedial Activity

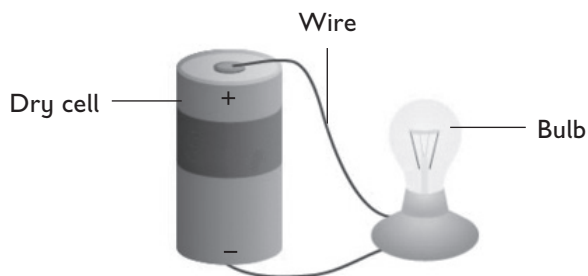
1. (d) Used in gas cookers
2. Light energy
3. Electric circuit

(b) Consolidation Activity

1. Conduct electric current in the circuit.
2. Converts electric current to light energy.
3. Is the source of electric power.
4. It breaks the circuit.

(c) Extension Activities

1. It has chemicals that are able to store current electricity. This electric power is able to flow in electric circuits in form of electric currents to the electric devices.
- 2.



3. A fuse is an electric device that breaks the circuit.
 - The fuse breaks the flow of current to the electric device in order to protect it from damage. This happens especially if there is high electric flowing in the circuit.

Topic Area: Materials and States of Matter

UNIT 16

:

MATERIALS

Number of periods: 10

Key Unit Competency

The learner should be able to classify materials according to their properties in metals and non-metals and calculate their density.

Background Information

Material refers to substance or a mixture of substances that constitute a thing. They may be man-made or artificial. Examples of natural materials and metals, wood, soil etc.

Learning Objectives

1. Knowledge and Understanding

- Identify common metals.
- Classify materials according to their properties.
- Differentiate metals according to their properties.
- State the use of metals.
- Name examples of objects made from metal.
- Explain how to calculate the density and the relative density of an object.
- Differentiate density of regular objects from irregular objects.
- Justify the applications of relative density in daily life

2. Skills

- Apply knowledge to describe metals.
- Use metals safely.
- Recognize the properties of metals.
- Maintain metals safely.
- Apply knowledge to calculate the density and relative density of an object.

3. Attitudes and Values

- Develop positive attitude to use different metals.
- Pay attention to different metals around them.
- Show concern of mass and volume surrounding objects to use the more effectively.

Summary Table of Lessons

Lesson	Content	Learner's Activities
1 Classification of materials	Classification of materials as metals and non-metals.	Observing, identifying and grouping different materials according to their properties.
2 Physical properties of metals	Physical properties of metals.	Identify properties of metals.
3 Uses of common metals	<ul style="list-style-type: none"> • Uses of metals such as iron, copper, aluminum etc. 	<ul style="list-style-type: none"> • Investigating uses of different metals. • Naming objects made of metals. • Identifying uses of different metals.
4 Maintenance of metals	<ul style="list-style-type: none"> • Different ways of maintaining metals. 	<ul style="list-style-type: none"> • Maintain metals observe how metals are maintained. • Discover density. • Measuring mass of different objects.
5 Density	<ul style="list-style-type: none"> • Calculating density of objects from the relationship: Density = $\frac{\text{Mass}}{\text{Volume}}$ 	<ul style="list-style-type: none"> • Experiment to compare the mass with the volume of different materials.
6 Density	<ul style="list-style-type: none"> • Calculating density of objects from the relationship: Density = $\frac{\text{Mass}}{\text{Volume}}$ 	<ul style="list-style-type: none"> • Calculate the ratio between the mass and volume. • Compare different values of densities.
7 Relative density	Relative densities of liquids.	Measure the density of different liquids using a hydrometer.
8 Application of relative density	Application of relative density.	<ul style="list-style-type: none"> • Compare different values of densities of measured objects with the density of water. • Observe and compare behaviour of different objects in water.
9 Evaluation	Revision Activity 16	Answer theory questions in Revision Activity 16.

10 Evaluation	Revision Activity 16	Answer practical questions in Revision Activity 16.
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Cross-cutting Issues

(i) *Financial Education*

Materials are necessary and help us in many ways. The teacher educates the learner about taking care of them. This is because they are a source of income to many of us, struggle to acquire them.

(ii) *Inclusive Education*

All learners should actively participate in group activities regardless of their disabilities

(iii) *Environment and Sustainability*

Let learners be aware that many waste materials pollute the environment. Therefore, materials that are worn out and those not in use should be disposed of appropriately to avoid polluting the environment.

16.1: Classification of Materials

Number of periods: 2

Reference: Pupil's Book page 205, relevant textbooks and Internet.

Learning Objectives

By the end of this lesson the learners should be able to:

Knowledge and understanding

- Identify common metals and materials

Skills

Group materials as metals or non-metals.

Attitudes and Values

- Develop concern towards using different metals.
- Care for metals.
- Curiosity to know more about metals.

Learning/Teaching Methods

- Discussion in groups
- Demonstration
- Practical activity
- Question and answer

Learning/Teaching Materials

- Real objects e.g bell, thread, nail, spoon, plastic pens, books, glass, sauce pan etc.

- Charts
- Drawing in pupils books
- Wooden handle or rug
- Source of heat

Learning Activity

Group various objects according to their properties.

Lesson Preparation

Collect all the items needed for the lesson and bring them to class.

Learning/Teaching Steps

- Ask learners to look at introductory pictures in Pupil's Book page 204. Let them discuss the identity of each picture and predict what they are going to learn in the unit.
- Display charts and learning materials on the table.
- Let each group draw the table in Activity 16.1 (Pupil's Book page 205) in their Notebooks.
- Guide the learners to group the materials as metals or non-metals.
- In their groups let them discuss reasons for grouping of materials as either metal or non-metal.
- Ask learners to name materials made of metals.
- Instruct them to carry out Activity 16.2 on page 207 in groups of four. Supervise their activities to prevent accidents.
- Let them discuss the property of metals investigated and other properties as well.
- Let one of them present their work to the rest of the class.

Assessment

Mark learners work to assess their understanding of the content.

16.2: Use and maintenance of Common Metals

Number of periods: 2

References:

- Pupil's Book page 208
- Relevant textbooks
- Internet
- XO laptop

Learning Objectives

By the end of the lesson, the learners should be able to:

Knowledge and understanding

- Name examples of objects made from metals.

- Identify what metals common objects are made of.

Skills

- Identify objects made from metals.
- Maintain metals.

Attitudes and Values

- Effective communication
- Co-operation
- Responsibility.

Learning/Teaching Materials

- Real objects e.g. spoons, coins, sauce pans, necklaces etc.
- Pens
- Notebooks
- Charts
- XO laptops

Learning/Teaching Methods

- Question and answers
- Observation
- Group discussion

Learning Activities

- Observe and feel materials made from metals
- Classify objects according to metals they are made of.

Lesson Preparation

- Ensure all the learning materials are available in class.

Learning/Teaching Steps

- (i) Ask learners to place metallic materials on a large surface.
- (ii) Allow them to touch the materials as outlined in Activity 16.3 Pupil's Book page 208.
- (iii) Ask them to say what metal each material is made of.
- (iv) Ask them to discuss ways of maintaining metals.
- (iv) Explain to them uses of metals and type of metals used to make objects.

Assessment

Assess learners' ability to recognise metals that common materials are made of.

16.4: Density

Number of periods: 2

References:

- Pupil's Book page 210
- Internet
- Relevant textbooks
- XO laptop

Learning Objective

By the end of the lesson, the learners should be able to:

Knowledge and understanding

- Explain how to calculate density.
- Differentiate density of regular objects from irregular objects.

Skills

Determine density of objects experimentally.

Calculate density.

Attitudes and Values

- Co-operation
- Curiosity
- Confidence

Learning/Teaching Methods

- Question and answers
- Observation
- Discussion
- Manipulation
- Recording

Learning/Teaching Materials

- Real materials
- Board
- Textbooks

Learning Activities

- Experiment to discover density.
- Experiment on measuring density of different materials.

Lesson Preparation

Ensure all learning materials are available.

Learning/Teaching Steps

- Ask learners to sit in their working groups. Tell them to discuss and define the term density.
- Assign them 2 practice questions on calculating density.
- Distribute all materials needed for the lesson in their groups.
- Let them follow the steps in pupil book page 211 – 212 to carry out the experiment.

(v) Ask them to use the values recorded to calculate density.

Assessment

- Observe learners as they do experiments to know if they have understood the content.
- Use the information gathered to prepare remedial classes for underachieving learners.

16.5: Relative Density

Number of periods: 2

References:

- Pupil's Book page 213
- Internet
- Relevant textbooks
- XO laptop

Learning Objective

By the end of the lesson, the learners should be able to:

Knowledge and understanding

- Explain how to calculate relative density of an object.
- Justify the applications of relative density in daily life.
- Calculating relative density

Skills

Apply relative density in life.

Attitudes and Values

- Responsibility
- Curiosity to know more about relative density.
- Co-operation
- Working in groups

Learning/Teaching Methods

- Question and answers
- Observation
- Discussion
- Manipulation
- Recording

Learning/Teaching Materials

- Charts
- Real objects
- Pictures in Pupil's Book
- Board
- Pen and books

Learning Activities

Experiment on behaviour of different objects in water and relative density.

Lesson Preparation

Ensure all learning resources are available in class.

Learning/Teaching Steps

- (i) Ask learners to explain what relative density is. Give them time to research using their XO Browse Activity.
- (ii) Show them pictures of a hydrometre. Explain to them that a denstometre is used to measure density.
- (iii) Distribute the materials for Activity 16.7 in their groups.
- (iv) Let them follow the steps on Pupil's Book page 215 to carry out their experiment on floating and sinking.
- (v) Allow them to discuss the behaviour of different objects in water (floating and sinking) and relative density.
- (vi) Ask them to record their findings in their notebooks.
- (vii) Let them present their work for marking.

Assessment

Analyse the results and tailor your teaching towards addressing strengths and weaknesses of individual learners.

(a) Remedial Activity

- Let learners collect various materials and classify them as metal and non-metallic materials.
- Learners to investigate and say aloud the properties of metals.
- Give simple multiple choice questions to test use and maintenance of metals.
- Give and demonstrate simple calculation on density.

Example of questions

1. Natural materials are classified into two (a) _____ (b) _____.
2. _____ is the mass of an object divided by the volume. (weight, density)
3. Objects that have a lower density than water _____ on water. (sink, float)

(b) Consolidation Activity

- Let learners carry out simple practicals and fill their findings in a table.
- Let learners sit in groups and identify the properties of metals.
- Give learners structured questions and open ended questions for learners to answer correctly.

Example of questions

1. List down five common metals.
2. How do you calculate density?
3. What is the use of gold and silver.

(c) Extension Activity

- Learners to research and write down reasons for classifying materials into their metallic or non-metallic.
- Learners to research and write down other properties of metals.
- Learners to make a brief summary on properties of metals and their maintenance.
- Using charts, give relatively complete calculations involving density.

Example of questions

1. Define galvanisation.
2. Describe briefly reasons for grouping materials as non-metals and metals.
3. Calculate the density of wood that has a mass of 500 kg and volume of 20m^3 .

Answers to Practice Activities 16.1

1. (i) In building and construction
(ii) In electronics like TV, mobiles and fridges.
(iii) In farming we require metal tools.
(iv) Making locks, lockers and cupboards.
(Any other relevant answer.)
2. Copper
3. Iron
Copper
Tin (Any other relevant answer.)

Possible Answers for Revision Activity 16

Number of periods: 2

Reference: Pupil's Book page 216

1. Metals and Non-metals
2.
 - They are poor conductors of both heat and electricity.
 - Most of them have a dull appearance.
 - They are soft and break easily.

3.	(a)	Spoon	Steel / Iron
	(b)	Rwandan 100 franc coin	Copper
	(c)	Electric wire	Copper
	(d)	Iron sheets	Iron
	(e)	Diamond necklace	Diamond

- 4.
- Conductivity of heat
 - Their heaviness
 - Their sonorousness
 - Their malleability
 - Their appearance.
- 5.
- Collect water in a measuring cylinder or marked container.
 - Note the initial levels off water in the cylinder. Record it as initial volume of water.
 - Tie a piece of thread around the ring.
 - Lower the ring gently into the measuring cylinder.
 - Note the final levels of water. Record it as a final volume of water.
 - Find the volume of ring as follows:

Volume of metal = final volume of water – Initial volume of water

6. (a) density = $\frac{\text{mass}}{\text{volume}}$ (b) $\frac{1000}{50} = 20 \text{ kg/m}^3$

7. Mass = volume × Density
= 12 × 10 = 120 g

8. 85 – 63 = 22 cm³

9. (a) It is used to measure mass of different materials.
(b) kilograms

10. (a) Objects with higher density than water sink and objects with lower density float.

- (b)
- In making ships Ship have lower density than the water.
 - In building parts of aeroplanes.
 - Making of swimming and diving equipment.

11. (a) Galvanising is applying a protective zinc coating to iron.

- (b)
- Painting the iron sheets to prevent corrosion.
 - Can apply a protective zinc coating to iron sheets to protect them from rusting

Answers to Remedial, Consolidation and Extension Activities

(a) Remedial Activity

1. (a) Metals (b) non-metals
2. Density
3. Float

(b) Consolidation Activity

1. Iron, copper, silver, gold, tin aluminium
2. When you divide the mass of that substance by its volume $\frac{M}{V}$
3. making jewelry

(c) Extension Activity

1. Process of applying protective zinc coating to iron.
2. They are poor conductors of heat and electricity, they are soft, break easily and most have dull appearance.
3. $\frac{500 \text{ kg}}{20 \text{ m}^3} = 25 \text{ kg/m}^3$

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