



BIOLOGY

SAMPLE SCRIPTED LESSONS

FOR
LOWER SECONDARY (S1-S3)

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FOREWORD

Dear teachers,

Rwanda Basic Education Board (REB) is honoured to present to you this booklet of sample scripted lessons of Biology O-level (S1-S3). This booklet serves as a reference to competence-based teaching and learning that uses the active approaches to ensure consistency and coherence in the learning of the Biology content.

In line with efforts to improve the quality of education, the Government of Rwanda emphasizes the importance of aligning teaching and learning materials with the syllabus to facilitate the teaching and learning process. Many factors influence what they learn, how well they learn and the competences they acquire. Those factors include the relevance of the specific content, the quality of teachers' pedagogical approaches, the assessment strategies, and the instructional materials.

The sample scripted lessons are developed to serve you as reference of a detailed description of all steps of a lesson that respects the 5Es Instructional Model. This model consists of cognitive stages of learning that comprise engage, explore, explain, elaborate, and evaluate. Through this approach, students redefine, reorganize, elaborate, and change their initial concepts through self-reflection and interaction with their peers and their environment. As a result, learners interpret objects and phenomena observed in their real-life experience and internalize those interpretations in terms of their current conceptual understanding.

Even though this booklet contains the guidance on the main steps of the lesson, you are requested to regularly plan your lessons as usual basing on the situation of your class environment: level of pupils, teaching materials and motivating situation available at your school.

I wish to sincerely express my appreciation to the people who contributed towards the development of this booklet, particularly, REB staff, UR-CE Lecturers, Teachers, and experts from local and international organizations for their technical support.

Dr. MBARUSHIMANA Nelson

Director General, REB

ACKNOWLEDGMENT

I wish to express my appreciation to the people who played a major role in the development of this booklet of sample scripted lessons of Biology O-level (S1-S3). It would not have been successful without active participation of different education stakeholders.

I owe gratitude to University of Rwanda College of Education and other schools in Rwanda that allowed their staffs to work with REB in the sample scripted lessons production initiative.

I wish to extend my sincere gratitude to lecturers and teachers whose efforts during writing exercise of this booklet of sample scripted lessons was very much valuable.

Finally, my word of gratitude goes to the Rwanda Basic Education Board staff who were involved in the whole process of producing this Teaching and Learning Resource.

Joan MURUNGI

Head of CTRLR Department

INTRODUCTION

Rwanda Basic Education Board (REB) is implementing the “Rwanda Quality Basic Education for Human Capital Development” Project.

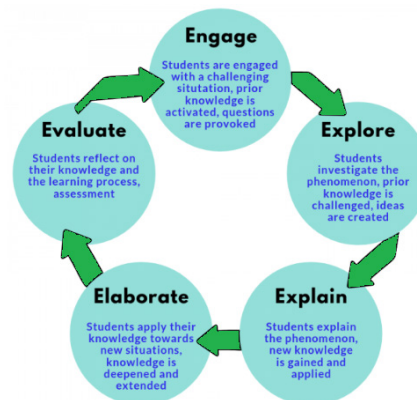
The sub-component 1.2 of this project is being implemented by REB in collaboration with University of Rwanda College of Education (UR-CE). This sub-component aims at enhancing teacher effectiveness for improved student learning through support of professional development of Mathematics and Science teachers.

The project is helping teachers to use technology to improve their way of teaching through a complete yet simple package that includes the scripted lessons developed in One Note to be used in the classroom. These scripted lessons in One Note incorporate the 5Es instructional Model. As One Note is a computer software used in teaching and learning, schools having electricity were the main beneficiaries of the project.

For equity purpose, REB has decided to help teachers from schools without electricity to also use the same 5Es instructional model by developing, in Microsoft word, the sample scripted lessons. This booklet contains such lessons and serves as a reference to competence-based teaching and learning that infuses the 5E Instructional Model to ensure consistency and coherence in the teaching and learning of the Science and Elementary Technology content.

The 5Es instructional model

The 5Es Model of Instruction is a teaching and learning model that promotes active learning. It states that teaching and learning progresses through five phases: Engage, Explore, Explain, Elaborate and Evaluate.



In this model, students are involved in more than listening and reading. They learn to ask questions, observe, model, analyse, explain, draw conclusions, argue from evidence, and talk about their own understanding. With the 5 Es instructional model, students work collaboratively with peers to construct explanations, solve problems, and plan and carry out investigations.”

Phase 1: Engage

The first phase of the 5E Model engages students by having them mentally focus on a phenomenon, object, problem, situation, or event. The activities in the Engage phase are designed to help students make connections between past and present learning experiences, expose prior conceptions, and organize thinking toward the essential questions and learning outcomes of the learning sequence.

The role of the teacher in the Engage phase is to present a situation, identify the instructional task, and set the rules and procedures for the activities. The teacher also structures initial discussions to reveal the range of ideas, experiences, and language that students use which become resources for upcoming lessons.

Teaching Strategies

- Raises questions or poses problems;
- Elicits responses that uncover students’ current knowledge;
- Helps students make connections to previous work;
- Posts learning outcomes and explicitly references them in the lesson;
- Invites students to express what they think;
- Invites students to raise their own questions.

Phase 2: Explore

Once students have engaged in activities, they need time to explore ideas. Explore activities are designed so all students have common, concrete experiences which can be used later when formally introducing and discussing scientific and

technological concepts and explanations. Students have time to investigate objects, events, or situations. As a result of their mental and physical involvement in these activities, students question events, observe patterns, identify and test variables, and establish causal relationships.

The teacher's role in the Explore phase is to facilitate learning. They initiate activities and allow time and opportunity for students to investigate objects, materials, and situations. The teacher coaches and guides students as they record and analyse observations or data and begin constructing models or initial explanations.

Teaching Strategies

- Provides or clarifies questions or problems;
- Provides common experiences;
- Observes and listens to students as they interact;
- Acts as a consultant for students;
- Encourages student-to-student interaction;
- Asks probing questions to help students make sense of their experiences and redirect them when necessary;
- Provides time for students to puzzle through problems.

Phase 3: Explain

The Explain phase consists of two parts. First, the teacher asks students to share their initial models and explanations from experiences in the Engage and Explore phases. Second, the teacher provides resources and information to support student learning and introduces scientific or technological concepts. Students use these resources and information, as well as ideas of other students, to construct or revise their evidence-based models and explanations. In engineering, students design solutions to problems based on established criteria.

Teaching Strategies

- Encourages students to explain concepts and definitions in their own words;

- Asks for justification (evidence) and clarification from students;
- Formally provides definitions, explanations, and information through mini-lecture, text, internet, or other resources;
- Builds on student explanations;
- Provides time for students to compare their ideas with others and if desired revise their ideas.

Phase 4: Elaborate

Once students have constructed explanations of a phenomenon or design solutions for a problem, it is important to involve them in further experiences that apply, extend, or elaborate the concepts, processes, or skills they are learning. Some students may still have misconceptions, or they may only understand a concept in terms of the exploratory experience. Elaborate activities provide time for students to apply their understanding of concepts and skills. They might apply their understanding to similar phenomena or problems.

Teaching Strategies

- Expects students to use vocabulary, definitions, and explanations provided previously in new contexts;
- Encourages students to apply the concepts and skills in new situations;
- Provides additional evidence, explanations, or reasoning;
- Reinforces students' use of scientific terms and descriptions previously introduced;
- Asks questions that help students draw reasonable conclusions from evidence and data.

Phase 5: Evaluate

It is important that students receive feedback on the quality of their explanations. Informally, this may happen throughout the learning sequence. Formally, the teacher can also administer a summative evaluation at the end of the learning sequence. The Evaluate phase encourages students to assess their understanding and abilities and allows teachers to evaluate individual student progress toward achieving learning goals and outcomes.

Teaching Strategies

- Asks open-ended questions such as, “Why do you think...?” “What evidence do you have?” “How would you answer the question?”
- Observes and records notes as students demonstrate individual understanding of concepts learned and performance of skills.
- Uses a variety of assessments to gather evidence of student understanding;
- Provides opportunities for students to assess their own progress.

When this model is used in the lessons, learners interpret objects and phenomena they observe in their real-life experience and internalize those interpretations in terms of their current conceptual understanding.

The following part contains examples of lessons selected from scripted lessons prepared in One Note. They can serve teachers as reference of lessons with the structure of 5Es instructional model.



SAMPLE SCRIPTED LESSONS OF BIOLOGY S1

LESSON FROM UNIT

1

First aid and the first aid kit

Subject: Biology	Grade: S1	
Lesson 4: First aid and the first aid kit		
SECTION/ STEPS	STEP –BY- STEP INSTRUCTIONS AND CONTENT	NOTICE TO THE TEACHER
1. Introduction (10 min)	<p>Teacher: Welcome to Biology lesson. I am sure you are going to enjoy today's lesson. Who can tell us a laboratory rule he/ she knows?</p> <p>Student: Some laboratory rules include the following: Do not eat in laboratory, do not run in laboratory, do not enter the laboratory without permission, etc.</p> <p>Teacher: What can happen if those rules are not followed?</p> <p>Student: There will be accidents in the laboratory.</p> <p>Teacher: Make a list of injuries that could result if laboratory rules are not followed.</p> <p>Student: When laboratory rules are not followed, there can be accidents such as Cut, skin burn, fire outbreak in laboratory.</p> <p>Teacher: What do you think we are going to learn?</p> <p>Student: We are going to learn first aid and the first aid kit</p>	<ul style="list-style-type: none">– Announce the title of the lesson if the students do not announce it– Give time learners to think on asked questions and allow them to provide their answers/ expectations.– Connect the learners' expectations related to this lesson to the key unit competence and lesson objectives.– Allow learners to ask questions about the topic of the day.

	<p>Teacher: Yes, you are right. We are going to learn First aid and the first aid kit. This lesson will allow you to attain the following objectives:</p> <ol style="list-style-type: none"> 1. Know what is first aid and first aid kit. 2. Use first aid kit. 3. Know what to do if someone is injured in the laboratory or need first aid. <p>Introductory activity</p> <p>Teacher: Have you ever seen Red cross volunteer? If yes, what is their job?</p> <p>Student: Yes, I have seen them. They help and save people who are sick or have accidents before getting to the hospital to avoid that the situation becomes worse.</p> <p>Teacher: What are the materials do they use while helping?</p> <p>Student: Adhesive bandages, gauze pads, antibiotics, antiseptic solution, elastic bandages.</p>	<p>Motivate them and raise their interest in following carefully the lesson such that they can contribute to the formulation the key questions related to how to use first aid kit in giving first aid</p>
<p>2. Lesson Development (25 min)</p>	<p>Activity 1</p> <p>Teacher: In groups of 5 students, observe the following pictures and answer the questions that follow:</p> <div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <p>Picture 1</p>  </div> <div style="text-align: center;"> <p>Picture 2</p>  </div> </div>	<ul style="list-style-type: none"> – Note on the chalkboard what the learner present. – Ask other learners to complement the previous presenter until the list is complete. – Always emphasize new concepts. – Build on learners' ideas to expand their knowledge

Picture 3



Picture 4



1. What is happening in the pictures 1,2,3 and 4?
2. According to the pictures above, what do you think first aid is?
3. What can you do after giving first aid to someone?

Students' presentation

1. On the pictures, there are people who are helping other people.
Picture 1 shows one fainted, suffocated (picture 2), bone fracture (picture3) and cut or wound (picture 4).
2. First aid is a help given to a sick or injured person until full medical treatment is available.
3. After giving to someone the first aid we have to take him/her to the health center or hospital.

Activity 2

Teacher: Observe the following figure and answer the asked questions

Picture 3



Picture 4



1. Make a list of all the items (things or materials) in the first aid kit observed on the picture 1 and above.
2. Work out what each item is used for.
3. According to questions (1) and (2) above, what is first aid kit?

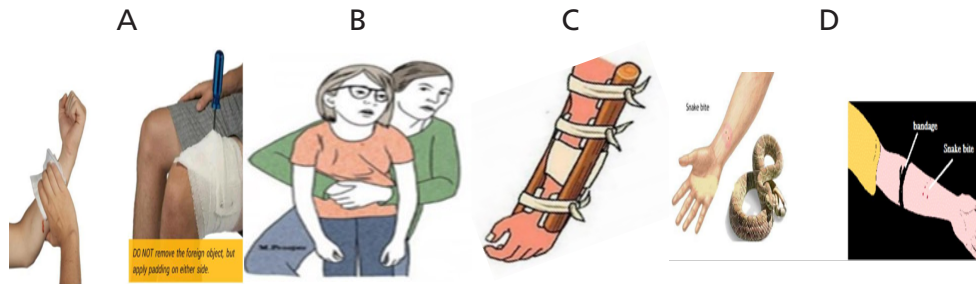
Students' presentation

1. In the first aid kit on pictures 1 and 2, there are items like Bandages, Scissors, Clean water, Gloves, Tablets, Hand sanitizer, thermometer, pain killers, sterile gauze, plaster band, safety pins, adhesive tape, antibiotics, ...
2. A first aid kit may include the following materials:
 - Bandages for covering wounds.
 - Clean water for drinking or washing hands or taking pain killers.
 - Soap for washing hands or cleaning wounds.
 - Gloves to protect hands during first aid.
 - Hand sanitizer for sterilizing surgical instruments or hands, cleaning wounds.
3. First aid kit is a collection of materials which are used when giving first aid.

- After each activity, remember to put an energizer/warm up to capture learners' attention.
- Guide them until the whole system is well explained.
- Use different questions to probe students to understand the content.
- Write on chalkboard the learners' answers
- Keep guiding learners in every step.
- Build a consensus after every activity and presentation.

Activity 3

Teacher: Observe the following figure and answer the asked questions



Teacher: Observe carefully the figures above then describe the first aid that was conferred to them and name the materials that might have been used.

Students presentation

1. Cut and wounds (A): In case of a cut, do the following:
 - Raise the injured part, wash the injured part using clean water, use a clean cloth to press directly on the wound as shown below. Keep pressing until bleeding stops.
2. Abdominal pain (B): Press into the belly with a sudden strong upward jerk.
3. Bone fracture and dislocation (C): Avoid forceful use of the limb long enough for the joint to prevent damage. heal completely. When a bone is broken, keep the bone in a fixed position using splints to prevent more damage.
4. Snake bite (D) : In case of a snake bite do the following:
 - Stay quiet and do not move the bitten part. The more the limb moves, the faster the poison will spread in the body. If the bite is on the foot, the person should not move at all. but tie an elastic bandage above the bitten part to stop the follow of venom in blood steam.

- Allow learners to present their answers
- Teacher orients the learner's answers

Application activity:

Teacher: How would you advise your friend who has been offered first aid lessons but is not interested?

Student: My friend who has been offered first aid but is not interested, I would advise her/ him to be interested because first aid will:

- Helps him/her save lives,
- Help him/ her relieve pain,
- Make people more secure,
- Prevent the situation from becoming worse and increases safety.

Teacher: Differentiate first aid from first aid kit.

Student: First aid is a help given to a sick or injured person until full medical treatment is available while aid kit is a collection of materials which are used when giving first aid.

Lesson Summary

First aid kit helps us to administer first aid to various victims as the first measure of saving lives.

After first aid, the patient should immediately be taken to hospital for further checkup.
















We can administer first aid to patients who have fainted, with burns, choking, with cuts and wounds, nose bleeding, with broken bones and dislocations. We can also give first aid to people who have snake bites and electric shock.

NB: The application activity helps learners to relate what they have learnt to real life experience

Provide an opportunity where students can ask questions, where the teacher can help every learner depending on his/her special educational needs, and ask some questions leading students to summarize the lesson learnt.

Various components of first aid kit

Table 1.2 The various components of a first aid kit and their uses

Component	Diagram	Use
i. Scissors or tweezers		Used for cutting bandages, strings or pieces of clothes.
ii. Assorted bandages		Used for tying round a part of the body that has been hurt or injured in order to protect or support it
iii. Sterilized cotton wool		Used for cleaning the skin or wound.
iv. New sterilized razor blade/ scalpel		Used for cutting any flaps of the skin while cleaning the wound.
v. A pair of tongs		Used for picking up and holding things. For example, holding a piece of bandage when cleaning the wound.
vi. Pain killers for example paracetamol		Medicines taken to reduce pain.
vii. Jar of petroleum jelly		Applied on cuts, scrapes, bruises and small wounds to make them soft.
ix. Antiseptic		A substance applied on cuts, abrasion, scrapes and open wounds to prevent infection by killing micro-organisms such as bacteria.
x. Soap		Used for cleaning wounds, injuries and hands during first aid.
xi. Clean water		Used for taking pain killers and also for washing hands during first aid.
xii. Sterile gauze		Used to cover the wound to allow enough air to get to the wound and help it to heal.
xiii. Safety pins		Used for holding pieces of bandages or cloth together.
xiv. Splints		Used to support broken bones and are tied using bandages.
xv. Gertian violet solution (GV)		Applied on wounds to help keep them clean and enable quick healing.
xvi. Methylated spirit		Used for cleaning wounds, injuries and to sterilise surgical instrument such as tongs, tweezers and scissors.

Provide opportunities for students to ask questions.

Methods of Treating injuries in the laboratory

Heat burn: Cool the burnt area by holding it under cool running water or water in a basin, until the pain lessens, Cover the burn with a sterile, non-stick bandage or clean cloth, Give the person pain relief, Go to a clinic or doctor.

Chemical burn: Put on gloves and protective clothing to avoid exposing yourself to the chemical. Flood the burnt area using cool water for at least 20 minutes, making sure that the water does not touch your own skin. Do not try to neutralise the burn using another chemical, Cover a small burn with a dry sterile cloth or bandage.

Cut: Stop the bleeding by applying direct pressure on the area, Clean the area using warm water, Apply antiseptic ointment, Cover the cut with a sterile bandage or non-stick plaster, If the cut is deep, go to a clinic or doctor.

	<p>Chemical in the eye: Remove any contact lenses immediately, Flush the eye immediately using cool water, and continue for about 15 minutes, Go to a clinic or doctor.</p> <p>Object in the eye: Wash your hands with soap and water to prevent infection, Flush out the eye using water, gently pull the upper eyelid over the lower one. This causes tears to form, which may flush out the object. If you can see the object, you may be able to use a clean cloth to gently wipe away the object. If the object cannot be removed, go to a clinic or doctor.</p>	<p>Provide opportunities for corrective feedback or positive feedback to students.</p> <p>If possible, take records of their performance after formative assessment and verify the achievement of learning objectives.</p>
<p>3. Assessment and Conclusion (5 min)</p>	<p>ASSESSMENT</p> <p>Teacher: What first thing that you should do if a chemical splash in your face or your colleague face in science laboratory?</p> <p>Student: My colleague must wash the face with cold clean water.</p> <p>Teacher: In case of a cut, what would you do?</p> <p>Student: I will do the following: Raise the injured part, wash the injured part using clean water, use a clean cloth to press directly on the wound, keep pressing until bleeding stops.</p> <p>Conclusion</p> <p>Teacher: We are coming to the end of the lesson. we have mainly studied the meanings of first aid and first aid kit, how to Use the first aid kit and what to do if someone is injured in the laboratory or in of need first aid. Hope everyone has captured the key content of this lesson.</p> <p>You will do the following homework to enhance your competences</p>	<p>Conclude the lesson by announcing the key subtitles and giving a homework to students</p>

Homework:

Has any one of you or your friend experienced one of the cases represented in pictures 1,2,3,4 displayed and used in activity 1? Explain how you have dealt with that issue?

Answer:

Yes, it was my colleague. He falls to the ground due to lack of oxygen (suffocation). We laid him on his back, place his lower hand on the belly between the belly and the ribs, we make for him a strong upward push finally we tried a mouth to mouth resuscitation.

Thank you for your participation in lesson, see you next.

LESSON FROM UNIT

3

External structure of a flowering plant

Subject: Biology	Grade: S1	Unit 3: External structure and importance of a flowering plant
Lesson 1: External structure of a flowering plant	Duration: 40 minutes	
Teaching and Learning materials: Flowering plants, charts of plants, manila papers, chalk board, etc.		
SECTION/ STEPS	STEP –BY- STEP INSTRUCTIONS AND CONTENT	NOTICE TO THE TEACHER
1. Introduction (10 min)	<p>Teacher: Welcome to Biology lesson. I am sure you are going to enjoy today's lesson. Who can tell us the main importance of plants on human being?</p> <p>Student: Plants are the main source of food to human beings.</p> <p>Teacher: What is the source of oxygen gas that we use in breathing?</p> <p>Student: Oxygen gas comes from green plants during photosynthesis</p> <p>Teacher: What can happen if there were no plants on Earth?</p> <p>Student: If there were no plants on Earth, life could have not been possible due to lack of oxygen for respiration.</p> <p>Teacher: Imagine a plant in the school garden, what are the main parts does it have?</p> <p>Student: The parts of a plant are roots, stem, flower, fruit, leaves.</p> <p>Teacher: Yes, many plants in our garden have flowers with other parts. What do you think we are going to learn today?</p> <p>Student: We are going to learn external structure of a flowering plant</p>	<ul style="list-style-type: none"> – Begin by gaining students' attention and readiness. – Ask general questions on the new unit to know the students' prerequisites. – Give time learners to think on asked questions and allow them to provide their answers/ expectations. – Connect the learners' expectations related to this lesson to the key unit competence and lesson objectives. – Ask learners the unit or lesson title.

Teacher: Very good. We start the new unit called “**External structure and importance of a flowering plant.**”

The key unit competence of this unit is “To be able to describe the external structure of a typical flowering plant”

The lesson of today is External structure of a flowering plant.

This lesson will allow you to attain the following objectives:

- Draw and label different parts of flowering plant.
- Differentiate flowering plants from other plants.
- Differentiate monocotyledonous and dicotyledonous plants.

Introductory activity



Teacher: Observe the plants above carefully then group these plants according to external characteristics.

Student: Plant A has long roots, leaves, flowers and fruits while plant B has short roots.

Teacher: What are the basis of grouping those plants?

Student: Those plants may be grouped based on roots, stem, leaves and flower.

- If learners do not announce them, announce and write them on the chalkboard.
- Communicate the key unit competence and lesson objectives.
- Allow learners to ask questions about the topic of the day.

Motivate them and raise their interest in following carefully the lesson such that they can contribute to the formation of the key question: “ **what are the parts of a flowering plant ?** ”

Teacher: What show that the plants above are flowering plants?

Student: They have flowers.

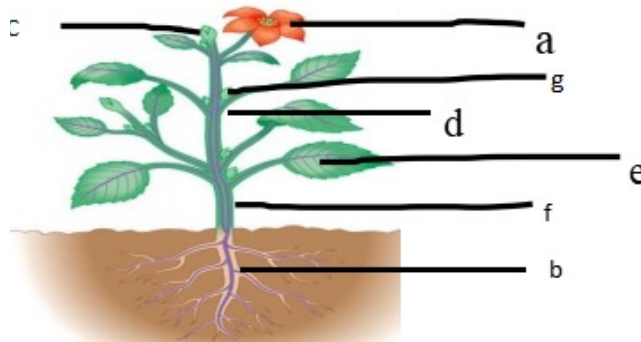
Teacher: Give 2 examples of non-flowering plants.

Student: Examples of non flowering plants are fern and moss.

- Note on the chalkboard what the learner present.
- Ask other learners to complement the previous presenter until the list is complete.
- Always emphasize new concepts

2. Lesson Development
(25 min)

Activity 1



Teacher: From your observation and your knowledge about parts of plant above, complete the above plant by Flower, leaf, stem, roots, terminal bud, axillary bud and node. a is done for you as example.

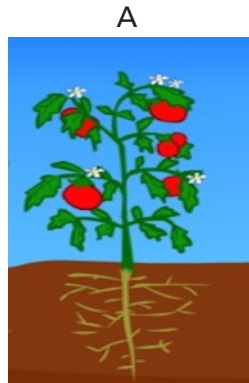
Students presentation

- a:** flower
- b.** Root
- c.** Axillary bud
- d.** Node
- e.** Leaf
- f.** Stem
- g.** Lateral bud

Build on learners' ideas to expand their knowledge.

Activity 2

Teacher: Observe carefully the plants A and B then state the main difference between plant A and B.



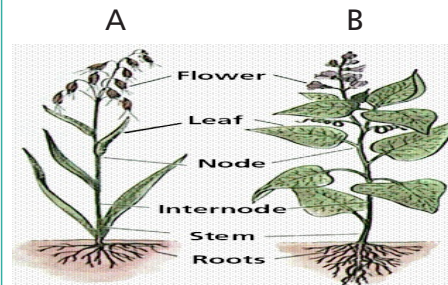
Students presentation

Plant A has flowers and fruits but plant B has no flowers and fruits.

Teacher: Well done. Let us do the next activity.

Activity 3

Teacher: With your group members, observe the plants (A and B) below carefully then answer the questions that follow.



After each activity, remember to put an energizer/warm up to capture learners' attention.

- Guide them until every question is well answered.
- Use different questions to probe students to understand the content.
- Keep guiding learners in every step
- Allow learners to present their answers
- Teacher orients the learner's answers
- Check if learners can relate what they have learnt to real life experience. Try to guide them.

The teacher helps every learner depending on his/her special educational needs, and ask some questions leading students to summarize the lesson learnt.

1. Identify the monocotyledonous plant and dicotyledonous plant between A and B
2. What are the difference between monocotyledonous and dicotyledonous plant?
3. Give other examples of monocotyledonous and dicotyledonous plant?

Students presentation

1. Plant labelled A is monocotyledonous while the plant labelled B is dicotyledonous
2. Monocotyledonous plant has seeds with one cotyledon, fibrous roots, leaves with parallel venation.
 - Dicotyledonous plant has: seed with two cotyledons, tap roots, leaves with network venation.
3. Examples of Monocotyledonous plants: maize, sorghum, sugar cane, ...
Examples of Dicotyledonous plants: beans, peas, ...

Application activity

- Teacher: Suppose you have wedding ceremony in your family, which parts of plant that can be used in making decoration?
- Student: Flowers and leaves can be used to make decoration.
- Lesson summary

Flowering plants are plants that have flowers, bear fruits and produce seeds.
The main parts of a

Flowering plants consists of roots, stems, leaves, flowers and fruits.

Flowering plants differ from other plants because they have flowers. There are two main groups of flowering plants: these are Monocotyledonous and Dicotyledonous plants. the main difference between them is that Monocotyledonous have seed with one cotyledon, fibrous roots leaves with parallel veins while Dicotyledonous have seed with two cotyledons, tap root, leaves with net like pattern of veins.

- Assess the achievement of objectives by using questions. Some questions can be presented orally and others in writing.
- Provide opportunities for corrective feedback or positive feedback to students.

If possible, take records of their performance after formative assessment.

Conclude the lesson by announcing the key subtitles and giving a homework to students.

**3. Assessment
and Conclusion
(5 min)**

Assessment

Teacher: What is flowering plant?

Student: Flowering plant is a plant that has flowers, bear fruits and produce seeds.

Teacher: What are the main parts of flowering plant?

Student: The main parts of a complete flowering plants are root, stem, leaves, flower and fruit

Teacher: Differentiate the flowering plant and non flowering plant.

Student: Flowering plants have flowers, bear fruits and produce seeds while non flowering plants never get flowers, hence no fruits or seeds.

Teacher: Where do flowering plant gets energy to make their own food?

Student: They get energy from the sun.

Conclusion

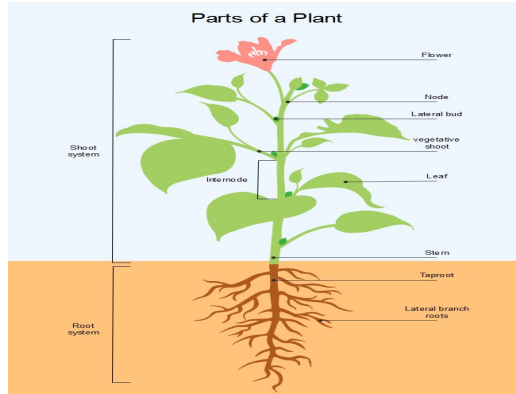
Teacher: We are coming to the end of our lesson. We have mainly studied how to draw and label different parts of flowering plant, to differentiate flowering plants from other plants and differentiate monocotyledonous from dicotyledonous plants. Hope everyone has captured the key content of this lesson.

You will do the following homework to enhance your competences:

Homework:

- a) Pick up a flowering plant and draw a well labelled figure of that flowering plant
- b) List all parts of a complete flowering plant which make up:
 - i) The shoot system ii) root system

Students answers



c) i) The shoot system is made up of stem, leaves, flower and fruit

ii) The root system is made up of roots.

Thank you for your participation, see you next.

LESSON FROM UNIT

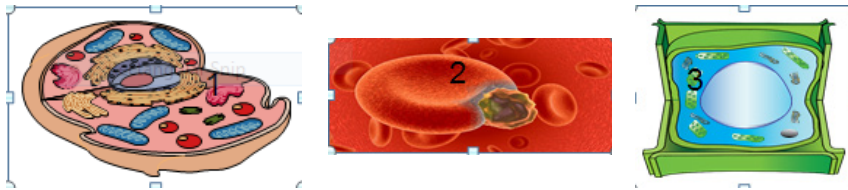
5

Structure of animal cell and plant cell

Subject: Biology	Grade: S1	Unit 5: Plant and animal cells
Lesson 2: Structure of animal cell and plant cell		Duration: 40 minutes
Teaching and Learning materials: Charts, diagram, manila papers, chalk board, biology s1 textbooks etc.		
SECTION/ STEPS	STEP –BY- STEP INSTRUCTIONS AND CONTENT	NOTICE TO THE TEACHER
1. Introduction (9 min)	<p>Teacher: Welcome to biology lesson. I am sure you are going to enjoy today's lesson. Who can define a cell?</p> <p>Student: A cell is basic unit of life.</p> <p>Teacher: Very right. Who can now tell us the two types of cell.</p> <p>Student: Plant and animal cell.</p> <p>Teacher: Observe carefully these diagrams. What do you see on these diagrams?</p> <p>Student: Diagrams represent different cells.</p> <p>Teacher: Based on what you see on diagrams, what do you think we are going to learn?</p> <p>Student: Today we are going to learn Structure of animal and plant cell.</p> <p>Teacher: Yes; today's lesson is Structure of animal and plant cell. This lesson will allow you attain the following objectives:</p> <ul style="list-style-type: none"> – Identify the different parts of the cell – Compare the structure of plant and animal cells – Appreciate the importance of cells in organisms 	<ul style="list-style-type: none"> – Begin by gaining students' attention – Ask questions to revise previous lesson – Give time learners to think on asked questions and allow them to provide their answers/ expectations. – Show diagram to learners of animal and plant cells – If learners are unable tell the lesson title, announce it yourself – Communicate the lesson objectives

Introductory activity

Teacher: Observe the following figures. What do you see on these figures?



Student: The figures represent different cells.

Teacher: Which cells are they?

Student: They are animal and plant cell.

Teacher: Are the figure 1,2 and 3 have the same shape?

Student: No. They have different shapes.

- Connect the learners' expectations related to this lesson to the lesson objectives.

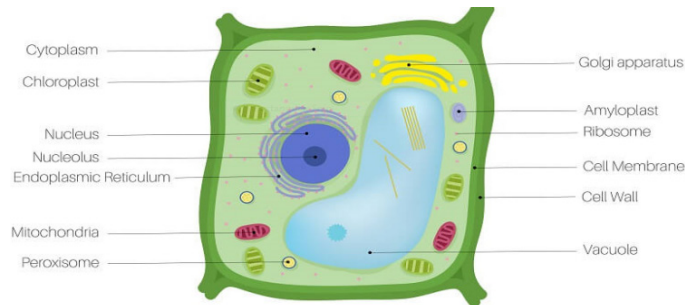
Display diagrams of structure of plant cell

- Give learners opportunity to reflect on the activities' questions.

2. Lesson Development (26 min)

Activity 1: To identify the main parts of plant cell

Teacher: In your groups, observe this displayed diagram of structure of plant cell and answer the following questions:



1. What do you understand by the term "plant cell"?
2. Identify the different structures of plant cell.
3. What is form of this plant cell?

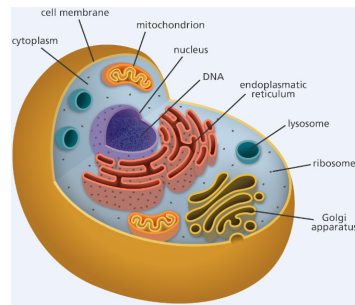
- Allow learners to ask questions about the topic of the day.
- Motivate them and raise their interest in following carefully the lesson such that they can answer the key.
- Display the figures of structure of plant cell
- Form the groups of five learners.
- Guide the learners in carrying out the category to do activity.

Students' presentation:

1. Plant cells are eukaryotic cells present in green plants, photosynthetic eukaryotes of the kingdom Plantae.
2. The plant cell consists of nucleus, mitochondrion, ribosome, Golgy, endoplasmic reticulum, cell wall, cell membrane, large vacuole, cytoplasm, chloroplast, nucleolus, peroxisome and amyloplast
3. The plant cell has rectangular form.

Activity 2: Identifying the main parts of animal cell

Teacher: In your groups, observe this displayed diagram of structure of animal cell and answer the following questions:



1. What do you understand by the term “animal cell”?
2. Identify the different structures of animal cell.
3. What is form of this cell?

Students' presentation:

1. Animal cells is the smallest unit of life in organisms of the kingdom Animalia
2. The animal cell consists of nucleus, mitochondrion, ribosome, Golgi apparatus, endoplasmicreticulum, cell membrane, cytoplasm and lysosome.
3. The animal cells are irregularly shaped.

- Students must be given time to think and note down their ideas.
- Ask a learner to present their findings/answers.
- Ask other learners to complement the previous presenter until the list is complete.
- Build on learners' ideas to expand their knowledge
- Allow them to present their findings
- Use different questions to probe students to understand the content.
- Keep guiding learners in every step.
- Build a consensus after every activity and presentation.

Activity 3: Stating functions of parts of plant cell and animal cell.

Teacher: In your groups and using your textbooks of biology S1, find out and discuss the functions of parts of plant and animal cell.

Students' presentation:

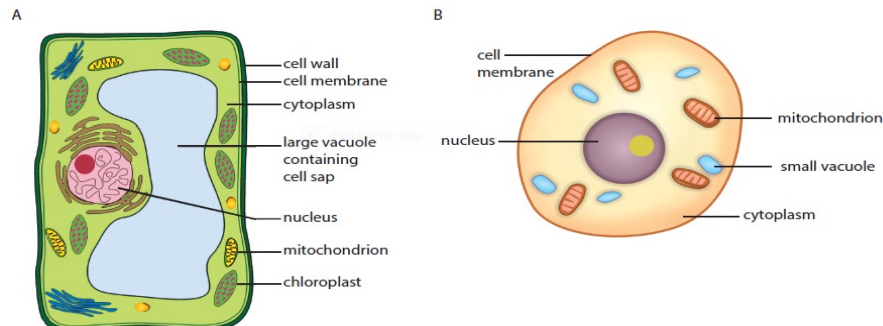
The functions of parts of plant and animal cell

Parts	Functions
Nucleus	Contain genetic materials
Cell wall	Gives cell shape
Cell membrane	Controls what goes in and out of the cell
Sap vacuole	Stores food substances, controls water movement
Cytoplasm	Living, jelly-like fluid in which reactions take place inside the cell
Chloroplast	Photosynthesis takes place here

Activity 4: Comparing structures between plant and animal cells.

Teacher: In your groups observe carefully the diagrams displayed and compare structures between plant and animal cell.

Generalised plant cell (A) and an animal cell (B) as seen under a light microscope



Students' presentations:**Similarities**

1. Both possess a cell membrane
2. They both have cytoplasm
3. Nucleus is present in both
4. They both store substances

Differences between plant and animal cells

Animal cell	Plant cell
Have no cell wall	Have cell wall
Have small vacuole if present	Often have larger sap vacuole
Have no chloroplast	Have chloroplast with chlorophyll
The nucleus is centrally located	The nucleus is at periphery
Do not make their own food	Make their own food
Store fats and glycogen	Store starch , protein and oils

Provide opportunities for students to ask questions.

Application activity:

Teacher: Why do you think that most of plants look green?

Student: Plants and their leaves look green because of the chlorophyll molecules found in chloroplast that absorb sunlight for photosynthesis.

Lesson summary:

- Plant cells are eukaryotic cells or cells with a membrane-bound nucleus.
- Animal cells are eukaryotic cells enclosed by cell membrane.
- Both animal cell and plant cell have some features in common such as cytoplasm, nucleus, cell membrane
- Chloroplasts and cell wall are only found in plant cell while flagella only in animal cell.

Use the ideas given by learners during formative assessment, enrich their feedback to summarise the lesson

3. Assessment and Conclusion
(5 min)

Assessment

Teacher: What is the function of the nucleus?

- A. gel like substance
- B. control center
- C. power house of the cell
- D. storage area

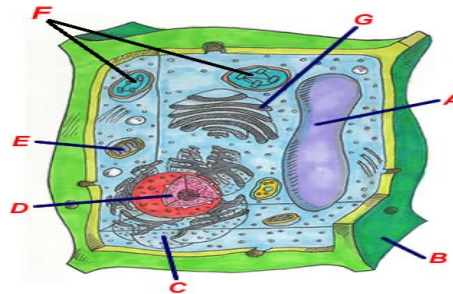
Student: B. Control center

Teacher: What is the structure that gives plants their rigid form?

- A. Cell membrane
- B. Cell wall
- C. Nucleus
- D. Mitochondrion

Students: B:Cell wall

Teacher: Label the following diagram from A to G



Student:

Answers : A: Vacuole B:Cell wall C:Ribosome D:Nucleus G:Golgi apparatus
E:Mitochondrion

If possible, take records of their performance and verify the achievement of learning objectives.

Conclusion

We are coming to the end of our lesson. We have mainly studied the main parts of plant and animal cell and their functions and comparison between plant and animal cell. Hope everyone has captured the key content of this lesson.

You will do the following homework to enhance your competence.

Homework:

Draw a plant cell and put all main parts.

Thank you for your participation, see you next.

LESSON FROM UNIT

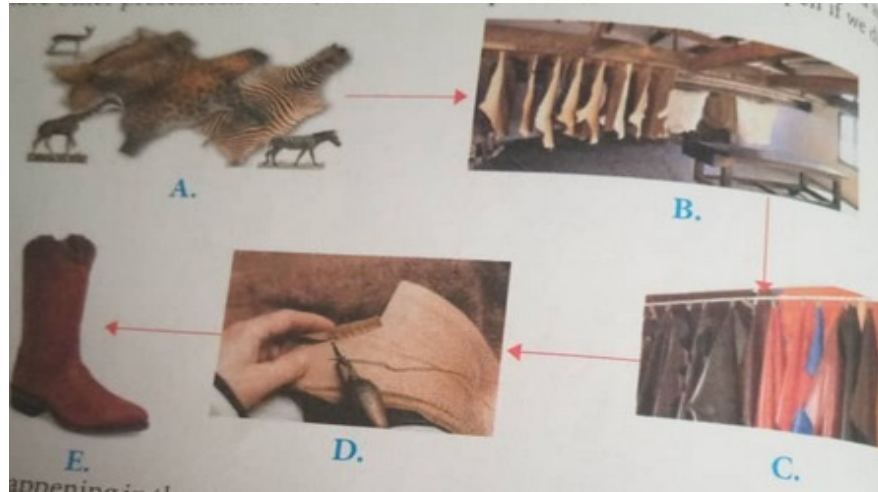
6

Levels of organisation in multicellular organisms

Subject: Biology	Grade: S1	Unit 6: Levels of organisation in multicellular organisms
Lesson 2: Levels of organisation in multicellular organisms		Duration: 40 minutes
Teaching and Learning materials: Wall charts, textbooks, manila papers, chalk board, diagrams, pictures etc.		
SECTION/ STEPS	STEP –BY- STEP INSTRUCTIONS AND CONTENT	NOTICE TO THE TEACHER
1. Introduction (10 min)	<p>Teacher: Welcome to Biology lesson. I am sure you are going to enjoy today's lesson. What do you understand by cell specialization?</p> <p>Student: Cell specialization is the process by which generic cells change into specific cells meant to do certain tasks within the body.</p> <p>Teacher: Give at least four examples of specialized animal cells and two of plants.</p> <p>Student: Examples of specialized cells in animals include ciliated cells, nerve cells, red blood cells sperm cells and specialized cells in plants include root hair cells, xylem cells.</p> <p>Student: After studying about cell specialization, today we are going to learn levels of organization in multicellular organisms.</p> <p>This lesson will allow you to attain the following objectives:</p> <ul style="list-style-type: none"> – Categorise plant and animal tissues through observation. – Appreciate the complexity of life from tiny cell to the tissue, organ, system and the organism levels organisation. 	<p>Asks questions about previous lesson.</p> <ul style="list-style-type: none"> – Give learners opportunity to reflect on the introductory questions – If learners are unable tell the lesson title, announce it yourself – Allow learners to ask questions about the topic of the day. – Build on their questions and communicate the key questions.

Introductory activity

Teacher: Observe the following chart. What do you see in pictures A, B, C, D, E?



Source: REB book S1

Student: There is a process of transformation of animal skins into shoes.

Teacher: What would happen if one step of the process is omitted in the flow chart?

Student: The process will be interrupted and no shoes will be made.

Teacher: Try to relate this to what happens in the cells of multicellular organisms.

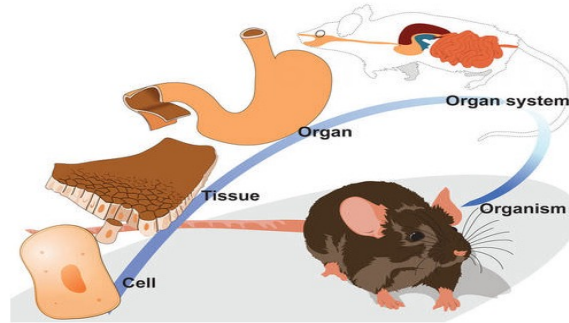
Student: In multicellular organism, cell are basic unit of life, group of specialized cells of the same function form tissue, group of tissues of the same function form organ, group of organs for same function form system, group of organ systems form organism. So if one level is missing, we cannot have an organism.

- Connect the learners' expectations related to this lesson to the key unit competence and lesson objectives.
- Give learners opportunity to reflect on the activities' questions.
- Allow learners to ask questions about the topic of the day.
- Motivate them and raise their interest in following carefully the lesson such that they can answer the key questions related to levels of organization in multicellular organism.

2. Lesson development
(25 min)

Activity 1:

Teacher: Look at the displayed diagram of structure of plant cell. In groups, observe and answer the following questions:



Levels of organisation in animals

1. Analyse the diagram and define a cell, tissue, organ, system and organism.
2. Give other examples of cells, tissues, organ and systems that make human organism?

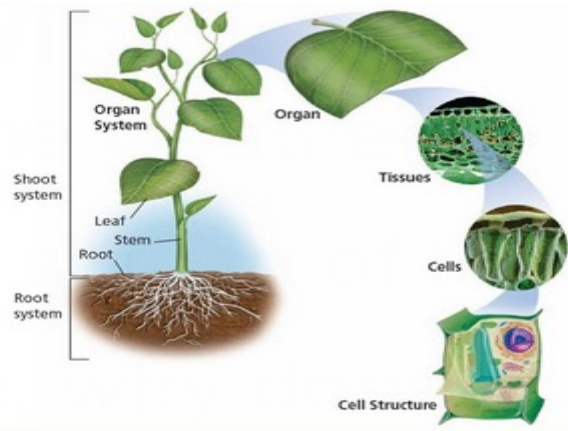
Students' presentation:

- **Cells** are the most basic unit of life. Example: ciliated cells, nerve cells, red blood cells and sperm cells.
- **Tissue** is a group of specialized cells which perform specific functions. Example: muscular tissue, blood tissue, nerve tissue.
- **Organs** are structures that are made up of tissues. Example, stomach, skin, lungs, brain, kidney and liver.
- **Organs system** consists of several organs working together to perform a function of life. Example: digestive system, respiratory system, reproductive system, excretory system and nervous system.
- **Organism** is an individual animal, plant, or single-celled life form. Example: Plant and animal.

- Form groups of five students
- Students must be given time to think and note down their ideas.
- Use different questions to probe students to understand the content
- Ask learners to explore and record their findings
- Ask learners to present their findings
- Build on learners' ideas to expand their knowledge
- Always emphasize new concepts.

Activity 2: Identifying levels of organization in plant

Teacher: Look at the displayed diagram of structure of plant cell. In groups, observe and answer the following questions:



Levels of organisation in plants

- Analyse and state the levels of organisation and give one example for each.
- Give other examples of cells, tissues, organ and systems that make plant organism.

Students' presentation

Levels of organisation and examples

Levels of organisation	Examples
Cells	Root hair cells, xylem cells in plants
Tissue	Xylem tissues, mesophyll tissues
Organs	Leaf, root, fruits, stem
Organ systems	Shoot system, root system., transport system

- After each activity, remember to put an energizer/warm up to capture learners' attention.
- Keep guiding learners in every step.
- Build a consensus after every activity and presentation.

Remember to give instructions to the learners.

Application activity:

Teacher: Read the following text and answer the asked questions:

Human body works as one machinery. One organ cannot work without others. For example, the heart pumping blood through blood vessels is in synergy with lungs inhaling and exhaling and delivering oxygen to blood. This oxygen is distributed to tissues and cells through blood vessels. Explain what would happen if someone get a cardiac shock and the heart stopped immediately?

Student' presentation

Sudden cardiac arrest occurs when the heart suddenly stops beating, which stops oxygen-rich blood from reaching the brain and other organs. A person can die from sudden cardiac shock in minutes if it is not treated right away.

Lesson summary:

Many cells that carry out the same function form a tissue. Animal tissues, such as muscle tissue, consist of similar cells that work together to perform a function.

Organs consist of many tissues that work together to do a certain function. Animal organs include the skin, heart, liver, brain, lungs kidneys; plant organs include roots, stems, flowers, leaves and fruits.

An organ system consists of many organs working together, for example, the digestive system in animals and the transport system in plants.

Provide opportunities for students to ask questions.

Guide learners to summarise the lesson

3. Assessment and Conclusion (5 min)

Assessment

Teacher: Arrange these structures in the correct order, starting with the smallest, organ, tissue, cell, organ system, organism.

Student: Structures in multicellular organisms are arranged from cell, tissue, organ, organ system to organism.

Teacher: Which organs are involved in the digestive system in animals

Student: The organs involved in the digestive system are: mouth, esophagus, stomach, small intestine, large intestines and anus in animals.

Conclusion

We are coming to the end of our lesson. We have mainly studied the levels of organization in multicellular organisms. Hope everyone has captured the key content of this lesson.

You will do the following homework to enhance your competence.

Homework

- Make a simple drawing showing organization in multicellular organisms from simplest to most complex.

Thank you for your participation, see you next.

Provide opportunities for corrective feedback or positive feedback to students.

If possible, take records of their performance and verify the achievement of learning objectives.

Provide equal chance to all categories of learners.

Use ideas given by learners during formative assessment

LESSON FROM UNIT

7

Food nutrients and food groups

Subject: Biology	Grade: S1	Unit 7: Food nutrients and diet
Lesson 1: Food nutrients and food groups		Duration: 80 minutes
Teaching and Learning materials: Charts, pictures and diagrams, maize, cassava, green banana, bread, sorghum, pictures, manila papers, chalk board, etc.		
SECTION/ STEPS	STEP –BY- STEP INSTRUCTIONS AND CONTENT	NOTICE TO THE TEACHER
1. Introduction (10 min)	<p>Teacher: For its substance, human being needs to eat food. What do you thing we get from food?</p> <p>Student: We get from food vitamins and energy that our body needs.</p> <p>Teacher: Why nutritionists advise people to eat different types of food?</p> <p>Student: People are advised to eat different types of food to get different vitamins or nutrients form those foods as different foods contain different components.</p> <p>Teacher: What do you think we are going to learn?</p> <p>Student: We are going to learn Food nutrients and food groups.</p> <p>Teacher: Yes, you are right. We start a new unit called “Food nutrients and diet”</p> <p>The key unit competence is “To be able to identify the different food nutrients and their significance to the human body”.</p>	<ul style="list-style-type: none"> – As you start a new unit, begin by welcoming learners and gaining their attention. – Ask learners questions to check their pertinent skills and knowledge on the new unit. – Give time learners to think on asked questions and allow them to provide their answers/ expectations. – Announce the key unit competence and the lesson objectives.

The lesson of today is **Food nutrients and food groups**. The lesson will allow you to achieve the following objectives:

- Identify the different food nutrients
- List the main sources of food nutrients
- List the chemical elements that make up carbohydrates, fats and proteins

- Connect the learners' expectations related to this lesson to the key unit competence and lesson objectives.

Introductory activity

Teacher: Observe the following food and answer the asked questions:



- Are the foods above the same? Name them.
- Can you group them depending on their importance on the body?
- Is it necessary to eat all those types of food? Justify.

Student: Presentations of students

- Give learners opportunity to reflect on the activities' questions.
- Allow learners to ask questions about the topic of the day.
- Motivate them and raise their interest in following carefully the lesson such that they can answer the key questions

2. Lesson Development
(25min)

Activity 1

Teacher: Observe the following food and answer the following questions



From the pictures above,

1. Name the above food and tell why do we eat different types of food at the same time?
2. What do you understand by food nutrients?
3. In food we eat some substances are used by our bodies and wastes are ejected.
 - a) What substances do we get from food that our body need?
 - b) Identify food that contains these food substances.
 - c) What would happen if we do not eat enough food?

Students' presentation

- Food nutrient are substances which organisms use for their body processes.
- The body requires different types of food substances in order to carry its functions properly. Our bodies require nutrients for the following reasons: Growth and development, replace worn out and damaged tissues, Protection against diseases and Energy giving. If we do not eat enough food, we will suffer from diseases.

Students must be given time to think and note down their ideas.

Always emphasize new concepts.

- Ask a learner to present their findings/answers.
- Note on the chalkboard what the learner present.
- Build on learners' ideas to expand their knowledge.

After each activity, remember to put an energizer/warm up to capture learners' attention.

- These food substances are: carbohydrates, lipids (fats and oils), proteins, vitamins, mineral salts and water.
- Foods are grouped in:
 - Bodybuilding foods (proteins).
 - Energy giving foods (carbohydrates).
 - Protective foods (vitamins and mineral salts).
- Example of sources of food nutrients:
 - Carbohydrates: Bread, rice, sugar, potatoes, cassava.
 - Proteins: Meat, milk, fish, milk, beans, eggs.
 - Lipids (fats and oils): fish, milk, cheese.
 - Vitamins: fruits, vegetables, milk, meat.
 - Mineral salts: table salt, milk, fruits, eggs.
 - Water: Drinking water fruit and vegetables, juices, food.

Activity 2:

Teacher: Here I have potato and knife. Can we cut potato in small part?



Student: Yes, we can.

Teacher: What does it mean?

Student: It means that potato is constituted by small parts.

Teacher: Can also those small parts be broken down?

Student: They can be broken down.

Use different questions to probe students to understand the content.

- Keep guiding learners in every step.
- Build a consensus after every activity and presentation.

	<p>Teacher: What does it mean in relation of food nutrient?</p> <p>Student: It means that food nutrients composed by chemical elements</p> <p>Teacher: In your group, research and discuss the chemical elements found in carbohydrates, lipids and protein.</p> <p>Students' presentation:</p> <p>Carbohydrates</p> <ul style="list-style-type: none"> – Carbohydrates are nutrients made up of the elements carbon (C), hydrogen (H) and oxygen (O). <p>Lipids</p> <ul style="list-style-type: none"> – Lipids are fats and oils. Fats are lipids that are solids at room temperature. – They are used mainly to store energy in the body of living things. Like carbohydrates, lipids are made of the elements carbon (C), hydrogen (H) and oxygen (O). <p>Proteins</p> <ul style="list-style-type: none"> – Proteins are nutrients made up of the elements carbon (C), hydrogen (H), oxygen (O) and nitrogen (N). Some proteins also contain the element sulphur (S). 	<p>Provide opportunities for students to ask questions</p>
	<p>Application activity:</p> <p>Teacher: Apart from energy giving and bodybuilding food, people are advised to eat fruits and vegetables. Explain why?</p> <p>Students' presentation</p> <p>Fruit and vegetables are a good source of vitamins and minerals. They're an excellent source of dietary fibre, which can help to maintain a healthy gut and prevent constipation and other digestion problems.</p>	<p>Provide opportunities for corrective feedback or positive feedback to students.</p> <p>Help learners to relate what they have learnt to real life experience by discussing the given case study</p>

Lesson summary:

- **The six groups of food nutrients are the following:**
Carbohydrates, lipids, proteins, vitamins, mineral salts, water
- Food nutrients are made up of elements such as carbon, hydrogen and oxygen, and sometimes nitrogen, phosphorus and Sulphur. For example, **Carbohydrates** are nutrients made up of the elements carbon (C), hydrogen (H) and oxygen (O). **Lipids** are fats and oils. Fats are lipids that are solids at room temperature. They are used mainly to store energy in the body of living things. Like carbohydrates, lipids are made up of the elements carbon (C), hydrogen (H) and oxygen (O). **Proteins** are nutrients made up of the elements carbon (C), Hydrogen (H), Oxygen (O) and Nitrogen (N). Some proteins also contain the element Sulphur (S).
- **The main sources of food nutrients:**
 - Source of Carbohydrates (sugars and starches) are: Bread, pasta, potatoes, cassava, maize, sorghum, rice, fruits, sweets, sugar.
 - Sources of Lipids (fats and oils) are: Nuts, fish oils, meat, milk, butter, cheese, cooking oil
 - Sources of Proteins are: Meat, milk, chicken, fish, eggs, groundnuts, soya beans, seeds
 - Sources of Vitamins are: Fruits, vegetables, meat, fish, milk, whole grain cereals, nuts
 - Sources of Mineral salts are: Salt, milk, meat, fruits, fish, eggs Water.
 - Sources of Drinking water are: fruit and vegetable juices, food.

Use the ideas given by learners during formative assessment, enrich their feedback to summarise the lesson.

**3. Assessment
and Conclusion**
(5min)

Assessment

Teacher: What are the six groups of food nutrients?

Student: Six groups of nutrients are: Carbohydrates, lipids, proteins, vitamins, mineral salts, water

Teacher: List the chemical elements that make up carbohydrates, fats and proteins

Student: Food nutrients are made up of elements such as carbon, hydrogen and oxygen, and sometimes nitrogen, phosphorus and sulphur.

Conclusion

Teacher: We are coming to the end of our lesson. We have mainly studied food nutrients, Chemical element that make up carbohydrates, proteins and lipids and the sources of food nutrients. Hope everyone has captured the key content of this lesson.

Homework:

- Why are we advised to drink a lot of water?
- What is the part of a balanced diet mainly responsible for muscle and repair? Why?

Thank you for your participation, see you next.

If possible, take records of their performance and verify the achievement of learning objectives.

LESSON FROM UNIT

8

Structure of the human gas exchange system

Subject: Biology	Grade: S1	Unit 8: Structure and functions of human gas exchange system	
Lesson 1: Structure of the human gas exchange system		Duration: 40 minutes	
Teaching and Learning materials: Charts, diagrams, flash cards, manila papers, chalk board, biology S1 textbooks etc.			
SECTION/ STEPS	STEP –BY- STEP INSTRUCTIONS AND CONTENT		NOTICE TO THE TEACHER
1. Introduction (10 min)	<p>Teacher: Welcome to Biology lesson. I am sure you are going to enjoy today's lesson. Who can tell us the importance of air on human being?</p> <p>Student: Human being needs air in respiration</p> <p>Teacher: What is the part of human body that helps in respiration?</p> <p>Student: The lungs help human in respiration.</p> <p>Teacher: What other parts involved in respiration?</p> <p>Student: Other parts involved in respiration are nose/mouth, pharynx, diaphragm...</p> <p>Teacher: What do you think we are going to learn?</p> <p>Student: We are going to learn Structure and functions of human gas exchange system</p> <p>Teacher: Very good. We start the new unit called "Structure and functions of human gas exchange system"</p>		<p>Begin by gaining students' attention</p> <ul style="list-style-type: none"> – Give time learners to think on asked questions and allow them to provide their answers/ expectations. – Connect the learners' expectations related to this lesson to the key unit competence and lesson objectives. – Give learners opportunity to reflect on the activities' questions.

The key unit competence of this unit is “To be able to describe the structure and functions of human gas exchange system”

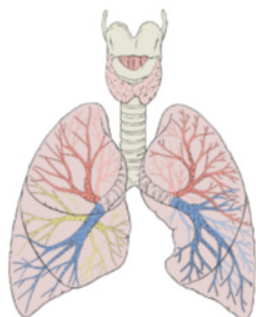
The lesson of today is: **Structure of the human gas exchange system**

This lesson will allow you to attain the following objectives:

- Identify diagrams and name main parts of gas exchange system in human
- Appreciate the importance of the human gas exchange system in human and other mammals.”

Introductory activity

Teacher: Observe the following chart. What do you see on that diagram?



Student: The diagram represents the lungs and other parts.

Teacher: The human body consists of different systems. Which system represented by the figure observed?

Student: The figure observed is the structure of **the human gas exchange system**.

Teacher: What do you think will happen to a person without such system?

Student: Person will die from lack of oxygen.

- Allow learners to ask questions about the topic of the day.
- Announce and write the unit title. Communicate the key unit competence.
- Announce and write the lesson title
- Communicate the lesson objectives.
- Motivate them and raise their interest in following carefully the lesson such that they can answer the key questions related to how human body exchange gases with
- Give learners opportunity to reflect on the activities' questions.
- Allow learners to ask questions about the topic of the day.
- Get various materials in advance

Teacher: How many main parts do you see on the system?

Student: There are two parts: left with two lobes and right part three lobes.

2. Lesson Development
(25 min)

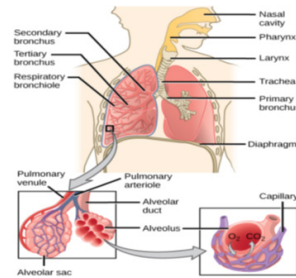
Activity 1

Teacher: Watch the video carefully and answer the following questions in your groups:

- * What is the gas exchange in the human?
- * Why is gas exchange necessary in human?
- * What are the main parts of human gas exchange system observed?

Or Answer the following questions in your groups:

1. Observe the diagram displayed and identify the main parts of the gas exchange system.
2. What is the gas exchange in the human?
3. Why is gas exchange necessary in human?



Students presentation:

1. The human gas exchange system consists of the nostrils, nasal passages, trachea, bronchi, bronchioles and alveoli.

- Motivate them and raise their interest in following carefully the lesson such that they can answer the key questions related to how human body exchange gases with the surrounding environment

Students must be given time to think and note down their ideas.

- If you are going to use a video:
 - Tell learners that they are going to watch a video
 - The video is on the slide provided.
 - Display the video by clicking on the link ["human-gaseous-exchange-system.mp4"](#) in provided power point slides.
 - Check before if the video has good sound and pictures to give students a chance to visualize.

2. Gas exchange is the movement of gas molecules across a surface or membrane which is called the gas exchange surface.
- The movement of gas molecules takes place by diffusion.
3. All organisms need to make energy through respiration, so they need oxygen and they produce carbon dioxide.
- In humans, gas exchange takes place inside the lungs and in the cells of the body.

Activity 2

Teacher: Explain the partway in gas exchange system.

Student: - Air is warmed and humidified in the nasal cavity.

- Air then travels down the pharynx, through the trachea, and into the lungs.
- In the lungs, air passes through the branching bronchi, reaching the respiratory bronchioles, which have the first site of gas exchange.
- The respiratory bronchioles open into the alveolar ducts, alveolar sacs, and alveoli. Because there are so many alveoli and alveolar sacs in the lung, the surface area for gas exchange.

Activity 3

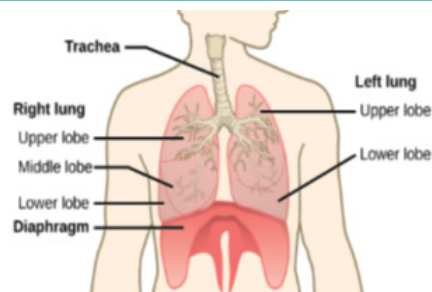
Teacher: In your groups, observe the diagram displayed and identify the main parts of the lungs. You will do that by matching the letters of the diagram with the names of the represented parts according to their descriptions.

- Ask a learner to present their finding.

Always emphasize new concepts.

After each activity, remember to put an energizer/warm up to capture learners' attention.

- Display again the diagram used in activity 1.
- Invite one learner to explain the pathway in gas exchange system using the displayed diagram.
- If one learner gets wrong, invite another to continue.
- Write on chalkboard the learners' answers
- Guide them until the whole system is well explained.
- Labels on the diagram of activity 3 must be removed and put letters. A box of description of every part represented by the letter must be on right side.



Structure of human lungs

Students: A is...., B is... etc.

Teacher: What are the main parts of the lung?

Student: The end of the trachea divides to the right and left lungs. There is right lung which is larger and contains three lobes, whereas the smaller left lung contains two lobes.

Application activity:

Teacher: Explain why it is better to breathe through nose rather than through mouth?

Student: The nose also adds moisture and warmth to inhaled air for smoother entry to the lungs. Nasal breathing, as opposed to mouth breathing, has another important advantage, especially for effective and efficient exercise. It can allow for more oxygen to get to active tissues.

Lesson summary:

- Gas exchange is the movement of gas molecules across a surface or membrane which is called the gas exchange surface.
- In humans, gas exchange takes place inside the lungs and in the cells of the body.
- The human gas exchange system consists of the nostrils, nasal passages, trachea, bronchi, bronchioles and alveoli.

Use different questions to probe students to understand the content.

- Keep guiding learners in every step.
- Build a consensus after every activity and presentation.

3. Assessment and Conclusion

(5 min)

Assessment

Teacher: Describe the gas exchange system in human.

Student: Gas exchange is the movement of gas molecules across a surface or membrane which is called the gas exchange surface.

- The human gas exchange system consists of the nostrils, nasal passages, trachea, bronchi, bronchioles and alveoli.

Teacher: Name two places where oxygen is exchanged against carbon dioxide in humans.

Student: In humans, gas exchange takes place inside the lungs and in the cells of the body.

Conclusion

Teacher: We are coming to the end of our lesson. We have mainly studied the meaning of gas exchange, the main parts of gas exchange system and the pathway of gas in gas exchange system. Hope everyone has captured the key content of this lesson.

You will do the following homework to enhance your competences:

Homework:

Draw a gas exchange system and put all main parts with arrows showing the pathway of gas in human gas exchange system.

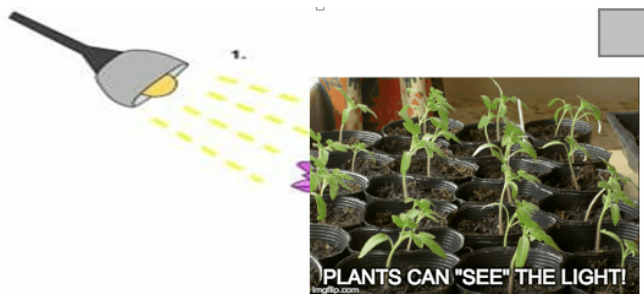
Thank you for your participation, see you next.

LESSON FROM UNIT

9

Phototropism

Subject: Biology	Grade: S1	Unit 9:Tropic responses
Lesson 2: Phototropism	Duration: 40 minutes	
Teaching and Learning materials: Charts, projector, slides, flash cards, manila papers, student book of biology senior one		

SECTION/ STEPS	STEP –BY- STEP INSTRUCTIONS AND CONTENT	NOTICE TO THE TEACHER
1. Introduction (10 min)	<p>Teacher: Welcome to Biology lesson. I am sure you are going to enjoy today's lesson.</p> <p>What do you observe about this diagram and these figure?</p>  <p>Student: On the diagram, there are light and plants.</p> <p>Teacher: What do you think we are going to learn in this lesson?</p> <p>Student: we are going to learn the process of phototropism.</p>	<p>Begin by gaining students' attention and readiness.</p> <ul style="list-style-type: none">– Let the learners to think on asked questions and allow them to provide their answers/ expectations.– Ask general questions on the new unit to know the students' prerequisites– Connect the learners' expectations related to this lesson to the key unit competence and lesson objectives.

Teacher: Yes, today's lesson is Phototropism. This lesson will allow you to attain the following objectives:

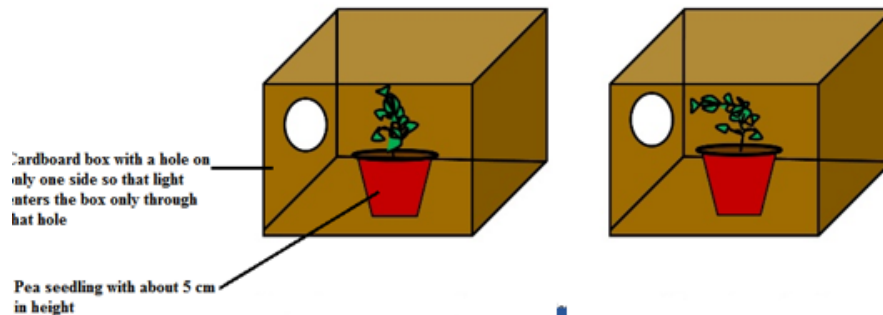
- Identify diagram, stimuli and responses of phototropism.
- Appreciate the importance of phototropism.

Introductory activity

Teacher: Display the chart and figure of phototropism ask students to Observe carefully the above diagram and describe what you observe?

Student: We observe that the phototropism oriented growth of a plant either toward or away from the source of light

Teacher: How can we prove that plants or their parts turning toward the light source? Describe how the it works.



Student: In phototropism, plants turn and bend towards the light to enable plant leaves and stem get easily sunlight. Plants bend towards the light coming from one direction. In phototropism, shaded side of stem grows faster than the part of stem that receives more light causing the plant to bend toward the light source.

– Give learners to reflect on the activities' questions.

– Allow learners to ask questions about the topic of the day and answer them.

Answer the key questions related to how plants respond with the surrounding environment.

The video is on the slide provided.

Check before if the video has good sound and pictures to give students a chance to visualize.

Students must be given time to think and note down their ideas.

Teacher: Seedlings of plants grow straight upward in dark environments in order to reach the sunlight above ground. Once they break through the surface, they start bending toward the main source of light. What will happen when the amount of the light that illuminate the plant is same on all sides of plant?

Student: The plant grows vertically straight when the amount of light that illuminate the plant is the same on all sides of plant.

Teacher: What is a type of tropic response observed when seedling turning or bending toward the light source?

Student: Positive phototropism is observed when seedling bending toward the light source.

Teacher: Which parts of plants that are sensitive to light in positive phototropism and negative phototropism

Students: Leaves and stems respond positively to light and they bend toward the source of light from one side and roots respond negatively to light.

Always emphasize new concepts.

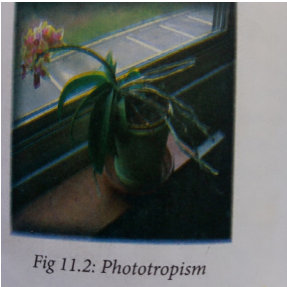
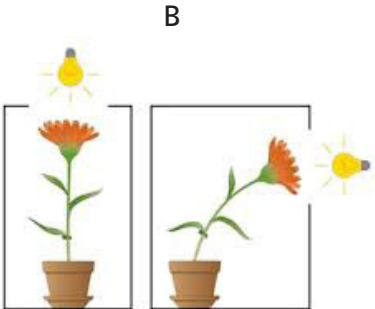
After each activity, remember to put an energizer/warm up to capture learners' attention for avoiding being bored It means to motivate them.

2. Lesson Development
(25 min)

Activity 1

Teacher: Observe carefully the following diagram and describe the process of phototropism.



	<p>Student: The process of Phototropism is the movement of plant toward the direction of sun light.</p> <p>Teacher: Why is phototropism necessary for plant?</p> <p>Student: Phototropism is necessary, because it helps the plant to grow and increase the area for making photosynthesis.</p> <p>Teacher: What are the conditions for phototropism?</p> <p>Student: The conditions for phototropism are the sun light plant, soil and favorable conditions like nutrients and water.</p> <p>Teacher: What are the types of phototropism?</p> <p>Student: The types of phototropism are: Positive phototropism and negative phototropism.</p> <p>Teacher: What happen if there is no chlorophyll in plant?</p> <p>Student: Without chlorophyll, the plant becomes etiolated.</p>	<p>Use different questions to probe students to understand the content.</p> <ul style="list-style-type: none"> – Keep guiding learners in every step. – Build a consensus after every activity and presentation. <p>Provide opportunities for students to ask questions.</p>
	<p>Activity 2</p> <p>Teacher: Observe the following diagrams (A & B) and choose which positive and negative phototropism in these diagrams are.</p> <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;"> <p>A</p>  <p><i>Fig 11.2: Phototropism</i></p> </div> <div style="text-align: center;"> <p>B</p>  </div> </div> <p>Student: A Present negative phototropism while B present positive phototropism</p>	<p>Provide opportunities for corrective feedback or positive feedback to students.</p> <p>Records the performance of learners and verify the achievement of learning objectives.</p> <p>Provide opportunities for students to ask questions.</p>

	<p>Application activity:</p> <p>Teacher: What will happen when the sacks filled with the germinating potatoes seed are placed near the opened window with transparent glasses?</p> <p>Students: The germinated Irish potatoes will sprout out of the sack toward the transparent window.</p> <p>Lesson summary</p> <p>Phototropism is the movement of plant toward the direction of sun light. The conditions for the phototropism are the followings: Sun light plant, soil and favorable conditions like nutrients and water. When they are absence of light plant become etiolated. There are two types of phototropism:</p> <ul style="list-style-type: none"> – Positive phototropism: When the plant grows towards the direction of light. – Negative phototropism: When the plant grows away from light. 	
<p>3. Assessment and Conclusion (10 min)</p>	<p>Assessment</p> <p>Teacher: Explain what is phototropism?</p> <p>Student: Phototropism is the growth response involving light. It is the movement of plant toward the direction of sun light.</p> <p>Teacher: What is the main factor influencing phototropism?</p> <p>Student: The factor that influences phototropism is light. It means light is the stimulus to which the plant responds by growing towards it.</p> <p>The conditions for phototropism are the sun light plant, soil and favorable conditions like nutrients and water.</p> <p>Teacher: What happen if survival plant placed in the area of insufficient light or absence of light during a long period of time?</p> <p>Student: In the area of insufficient light or absence of light, the plant becomes etiolated.</p>	<p>- Provide opportunities for corrective feedback or positive feedback to students.</p> <p>If possible, take records of their performance after formative assessment and verify the achievement of learning objectives.</p> <p>Conclude the lesson by announcing the key subtitles and giving a homework to students.</p>

Conclusion


Teacher: We are coming to the end of our lesson. We have studied phototropism and mainly discussed the factors that influence phototropism and types of phototropism.

You will do the following homework to enhance your competences:

Homework:

- Draw and explain positive and negative phototropism.
- Thank you for your attention and participation in this lesson.

Classification of diseases

Subject: Biology	Grade: S1	Unit 11: Classification of diseases
Lesson 1: Classification of diseases		Duration: 40 minutes
Teaching and Learning materials: Charts, videos, projector, slides, flash cards, manila papers, student book of biology senior one		
SECTION/ STEPS	STEP –BY- STEP INSTRUCTIONS AND CONTENT	NOTICE TO THE TEACHER
1. Introduction (10 min)	<p>Teacher: Welcome to Biology lesson. I am sure you are going to enjoy today's lesson.</p> <p>Observe the following diagram. What can you say about them?</p>  <p>Student: In the figure there are people, mosquito, and dump of water.</p> <p>Teacher: Do you think the elements on the figure may be source of diseases?</p>	<ul style="list-style-type: none"> – Greet learners and gain their attention. – Give the time to the learners to think on asked questions and allow them to provide their answers/ expectations. – Link the learners' expectations or answers to the key unit competence and lesson objectives. – Give learners time to reflect on the activities' questions.

Student: Yes. Infectious diseases, contamination diseases, etc.

Teacher: In your mind, what do you think we are going to learn in this lesson?

Student: We are going to study classification of disease.

Teacher: The lesson of today is classification of diseases

This lesson will allow you to attain the following objectives:

- To classify diseases into infections and non-infectious, inherited, degenerative, social, mental, eating disorders and deficiency diseases.
- To classify the diseases based on their causative agents.

Introductory activity:

Teacher: Read the following text and answers asked questions:

A team of students visit the hospital to sympathize with patients suffering from different diseases. When they enter in some rooms, they were asked to wear face masks and wash their hands with sanitizers but for other rooms they are not asked to do so and they are allowed to great patients by shaking their hands.

Questions:

1. How do people get infection?
2. Do you think the patients you met suffer from the same kind of diseases? Explain.

Student:

1. People get disease by transmission with agent Couse and by people to another.
2. No. Some suffer from both infectious and non-infectious diseases. Others suffer from one of the category

- Let learners to ask questions about the topic of the day and answer them.
- Answer the key questions related to classification of diseases
- Motivate them and raise their interest in following carefully the lesson such that they can answer the key questions related to how human body exchange gases with the surrounding environment.

2. Lesson Development
(25 min)

Learning activity 1:

Teacher: Watch the video carefully and answer the following questions in your groups:

1. What are the main categories of diseases?
2. Why is necessary to classify the diseases?
3. What is the full name of HIV?
4. What are some examples of infectious diseases and non-infectious diseases?
5. What happen when the body infected by a diseases?

Students presentation:

1. The types of classification of diseases are: infectious diseases and non-infectious diseases.
2. It is necessary to classify the diseases in order to avoid and cure them.
3. The full name of HIV is Human Immune Virus.
4. Some infectious diseases are: Cholera, HIV and AIDS. Some non-infectious diseases are: Cancer, Diabetes.
5. When the body infected by diseases the normal functioning of some parts of the body do not work well.

Learning activity 2

Teacher: observe. Carefully and answer the following question:



In which categories can you classify these pictures.

Students: These pictures are classified into:

1. Infectious diseases
2. Non-infectious diseases

Display the video by clicking on the link "<https://www.youtube.com/watch?v=8919Zm8Gi4U> provided power point slides

- The video is on the slide provided.
- Check before if the video has good sound and pictures to give students a chance to visualize.

Students must be given time to think and note down their ideas.

Always emphasize new concepts.

After each activity, remember to put an energizer/warm up to capture learners' attention for avoiding being bored It means to motivate them.

	<p>– In which categories can you classify these pictures below’</p> <p>Students: These pictures are classified into:</p> <ol style="list-style-type: none"> 1. Infectious diseases 2. Non-infectious diseases 	<p>Use different questions to probe students to understand the content.</p> <ul style="list-style-type: none"> – Keep guiding learners in every step. – Build a consensus after every activity and presentation. – Allow learners to present their answers – Orient the learner’s answers. <p>The application activity helps learners to relate what they have learnt to real life experience</p>										
	<p>Learning activity 3:</p> <p>Teacher: Using an arrow, match the names of diseases with its category of diseases.</p> <table border="0"> <tr> <td>1. HIV and AIDS</td> <td>a) Non-infectious disease</td> </tr> <tr> <td>2. Kwashiorkor</td> <td></td> </tr> <tr> <td>3. Tuberculosis</td> <td>b) Infectious diseases</td> </tr> <tr> <td>4. Diabete</td> <td></td> </tr> <tr> <td>5. Covid 19</td> <td></td> </tr> </table> <p>Student: Non-infectious diseases are:3,4 while infectious diseases are 1,3;5</p> <p>Teacher: What is the different between infectious diseases and non-infectious diseases?</p> <p>Student: The infectious diseases (communicable diseases) are the diseases that can be transmitted from one person to another while Non-infectious diseases (Non-communicable diseases) are the diseases that cannot be transmitted from one person to another.</p>	1. HIV and AIDS	a) Non-infectious disease	2. Kwashiorkor		3. Tuberculosis	b) Infectious diseases	4. Diabete		5. Covid 19		
1. HIV and AIDS	a) Non-infectious disease											
2. Kwashiorkor												
3. Tuberculosis	b) Infectious diseases											
4. Diabete												
5. Covid 19												
	<p>Application activity: A</p> <p>Teacher: Answer the following question in groups.</p> <p>Walk about where Mukamwiza lives near a swamp,</p> <ol style="list-style-type: none"> 1. Which diseases is she likely to suffer from? 2. How you can help Mukamwiza to fight against that problem? 											

3. In which category can you classify this disease? Based on what?

Students presentation:

1. Malaria;
2. Mukamwiza can fight that problem by cutting bush around the house, use insecticide to kill larvae
3. It is classified in infectious disease because it is transmitted by anopheles mosquito.

Application activity

Teacher: Covid-19 is a serious pandemic disease. The disease appeared for first time at the end of the year 2019 in the China. The disease was not taken seriously by some countries all over the world and it causes serious problems. People have been locked in their houses and tourism and jobs stopped in that period.

- a) What were the measures to stop that disease?
- b) Justify the role of each measure taken?

Student:

- a) Lock down - wear face masks when in public - Frequent hand wash using water or sanitizers when etc
- b) The peoples are masked in order to prevent contamination of Covid-19 etc

Lesson summary:

The diseases are grouped or classified into infectious (communicable) and Non-infectious (non-communicable) diseases.

Infectious diseases are the diseases which can be transmitted from one person to another.

Examples: Cholera, Tuberculosis, Typhoid, Ringworms, HIV and AIDS and Malaria.

Provide opportunities for students to ask questions.

Non-infectious diseases are the diseases that cannot be transmitted from one person to another.

Examples: Cancer, Kwashiorkor, Sickle-cell anemia, Albinism, Arthritis, Diabetes, Ageing and Cardiovascular diseases.

Also, the diseases can be classified based on their causative agent i.e.;

- **Bacterial** which are caused by Bacteria including Cholera, Tetanus, Typhoid fever, Tuberculosis, Pneumonia.
- **Viral** caused by viruses include: AIDS, Polio, Measles, Ebola and COVID-19.
- **Protozoan** which are caused by protozoa including Amoebic dysentery, Trypanosomiasis and Malaria.
- **Fungal** which are caused by fungi including Ring worms, Candidiasis, Athlete's foot.
- **Genetic** which are caused by inherited from parents or grandparents including Hemophilia, Sickle-cell anemia and Albinism.

Malnutrition disorders are the diseases caused by either lack of enough food, lack of the right type of food or eating too much calories in food.

For example: Marasmus, Kwashiorkor and Obesity.

Worm diseases are the diseases caused by worms include: Elephantiasis and Bilharzia.

Environmental diseases and allergies: are the diseases caused by production of abnormal immune Response to some substances. For example: Asthma and Hay fever.

Degenerative diseases: are the diseases caused by ageing, For example: Arthritis and Baldness.

Vitamin and mineral salts deficiency: are the diseases caused by lack of a certain vitamin or mineral In the diet. Include: Goitre, Anemia, Scurvy and Rickets.

	<p>Sexually transmitted diseases: are the diseases transmitted through sexual contact such as HIV and AIDS, Syphilis and Gonorrhoea.</p> <p>Mental diseases are the diseases caused by a wide range of mental conditions that affect mood, thinking and behavior. For example: Depression and Anxiety.</p>	
<p>3. Assessment and Conclusion (5 min)</p>	<p>Assessment Questions</p> <p>Teacher: What are the classifications of diseases?</p> <p>Student: The classifications of diseases are the following:</p> <p>(a) Infectious diseases.</p> <p>(b) Non-infectious diseases.</p> <p>Teacher: We classify the diseases in different classes, based on what?</p> <p>Student: We classify the diseases based on how it transmitted and based on their causative agent.</p> <p>Teacher: In a certain village that mostly depended on farming rain failed for three consecutive seasons.</p> <p>(a) Suggest disease the children are likely to suffer from.</p> <p>(b) As an advisor to the government, which foods will you recommend and why?</p> <p>Student: The diseases the children are likely to suffer from a certain village that mostly depended on farming, where the rain failed for three consecutive seasons is the following: Kwashiorkor.</p> <p>As an advisory to the government, the foods I will recommend to is a food which is rich in protein because a protein is a vital part of our diet, it means it makes much of our body tissue.</p>	<p>Provide opportunities for corrective feedback or positive feedback to students.</p> <p>Records the performance of learners and verify the achievement of learning objectives.</p>

Conclusion

Teacher: We are coming to the end of our lesson. We have mainly studied classification of diseases

Hope everyone has captured the key content of this lesson.

You will do the following homework to enhance your competences:

Homework:


-There is a Cholera outbreak in your location. What should you do to prevent yourself from getting the disease?

- Explain how you can prevent the spread of covid-19.

Thank you for your attention and participation. You are good students.

The spread and prevention of infections

Subject: Biology	Grade: S1	Unit 11: Classification of diseases
Lesson 2: The spread and prevention of infections		Duration: 40 minutes
Teaching and Learning materials: Charts, videos, projector, slides, flash cards, manila papers, student book of biology senior one		
SECTION/ STEPS	STEP –BY- STEP INSTRUCTIONS AND CONTENT	NOTICE TO THE TEACHER
1. Introduction (10 min)	<p>Teacher: Welcome to Biology lesson. I am sure you are going to enjoy today’s lesson. Last time we learnt about infectious diseases. Who can tell the consequence of infectious diseases?</p> <p>Student: The consequence of infectious diseases is to kill living organism.</p> <p>Teacher: In your village, what do people do to avoid infectious diseases?</p> <p>Student: To avoid infectious diseases, people do hygiene every time and eat well cooked food.</p> <p>Teacher: Yes, those are some measures of preventing infection. Based on that, what do you think we are going to learn?</p> <p>Student: We are going to learn the spread and prevention of infectious diseases.</p> <p>Teacher: Yes. The lesson of today is the spread and prevention of infections.</p> <p>This lesson will allow you to attain the following objectives: To describe ways by which infectious diseases spread. To explain ways of prevention of infections.</p>	<ul style="list-style-type: none"> – Give the time to the learners to think on asked questions and allow them to provide their answers/ expectations. – Links the learners’ expectations or answers to our lesson and the key unit competence and our lesson objectives. – Ask learners the unit or lesson title. – If learners do not announce them, announce and write them on the chalkboard. – Communicate the key unit competence and lesson objectives.

	<p>Introductory activity:</p> <p>Teacher: People in the refugee camps are likely to drink untreated water. What are the consequences they may face?</p> <p>Student: These people may be contaminated by infectious diseases due to uses of untreated water.</p>	<ul style="list-style-type: none"> – Allow learners to ask questions about the topic of the day. – Give learners to reflect on the activities' questions. – Let learners to ask questions about the topic of the day and answer them.
<p>2. Lesson Development (20 min)</p>	<p>Activity 1</p> <p>Teacher: Observe the pictures below then identify the source of infections in the community we are living in.</p>  <p>Students' presentation</p> <p>According to the pictures, the sources of infectious diseases include:</p> <ol style="list-style-type: none"> 1. Contaminated air 2. Contaminated water 3. Contaminated food 4. Contaminated soil 5. Contaminated body fluids 	<ul style="list-style-type: none"> – Answer the key questions related to the spread and prevention of infections – Display the video by clicking on the link "https://www.youtube.com/watch?v=8919Zm8Gi4U" – The video is on the slide provided. – Check before if the video has good sound and pictures to give students a chance to visualize.

Activity 2

Teacher: After analyzing the following pictures, discuss the modes of preventing infectious diseases.



Students' presentation:

Modes of preventions of infections include:

1. Mass teaching about infections
2. Improve hygiene conditions
3. Isolation of infected person
4. Immunise people against infections

Application activity

Teacher: Suppose you are a public health officer in the district, what do you think you can advise people to do in the community for well-being?

Student: In order to improve well-being, I can advise people to maintain hygiene and sanitation in order to prevent the spread of infectious diseases.

Teacher: In your family, you do not like to sleep in the mosquito net. What disease could you contaminate? In which category of disease is classified?

Student: The disease one can suffer from when he does not sleep in mosquito net is malaria. It is classified to infectious disease.

Students must be given time to think and note down their ideas.

Provide an opportunity where students can ask questions, where the teacher can help every learner depending on his/her special educational needs, and ask some questions leading students to summarize the lesson learnt.

Always emphasize new concepts.

After each activity, remember to put an energizer/warm up to capture learners' attention for avoiding being bored. It means to motivate them.

Lesson summary

Measures to prevent infectious diseases

The communicable diseases can be spread through water (water borne diseases such as Cholera), unprotected sexual intercourse (Sexually transmitted diseases such as HIV and AIDS), air (Air-borne diseases such as Tuberculosis, vector (diseases such as malaria), contact (Diseases spread through contact such as Ebola and COVID-19).

We should maintain hygiene and sanitation in order to prevent the spread of infectious diseases:

These diseases can be prevented in different ways:

- Tuberculosis is prevented by avoiding overcrowded places, opening windows in buildings or
- Public, Transport vehicles, avoid taking raw milk, covering one's mouth and/or nose when sneezing and immunizing children with a BCG vaccine.
- Cholera is prevented by Washing vegetables and fruits before eating them, cooking food properly, boiling or treating, drinking water, washing hands before eating and after visiting the toilet, vaccination during epidemics and improved disposal of human excreta.
- Malaria is controlled and prevented by draining marshes and stagnant water near our homes, spraying light oil containing insecticide on stagnant water, introducing fish-eating mosquitoes into stagnant water to feed on larvae and pupa and spraying walls of houses with long lasting insecticides, clearing any bushes and grass around the house, sleeping under a treated mosquito net, isolating those who become sick of malaria, filling up potholes and shallow pools, burying metallic or burning plastic containers that can hold water and giving preventive medication regularly.

Use different questions to probe students to understand the content.

- Keep guiding learners in every step.
- Build a consensus after every activity and presentation.
- Provide opportunities for students to ask questions.
- Provide opportunities for corrective feedback or positive feedback to students.

If possible, take records of their performance after formative assessment and verify the achievement of learning objectives.

	<ul style="list-style-type: none"> – Ebola and COVID-19 are prevented by washing hands often with soap and water or an alcohol-based hand sanitizer, avoiding close contact with people who are infected, refraining from touching your eyes, nose and your mouth, people entering the country should be screened, routinely cleaning and disinfecting commonly touched surfaces, isolating the infected and those who are in close contact with patients during an outbreak, ensuring that medical personnel who handle Ebola or COVID-19 patients use protective gear, for Ebola avoid getting into contact with wild animals or eating raw meat. For COVID-19, use one meter between two persons also use mask which cover a mouth and nose. – HIV and AIDS is prevented by abstaining, faithful, avoiding sharing cutting and piercing instruments, screening of blood for HIV and AIDS before blood transfusion and organ transplant and HIV positive mothers should not breastfeed their babies. 	<p>Conclude the lesson by announcing the key subtitles and giving a homework to students.</p>
<p>3. Assessment, and Conclusion (10 min)</p>	<p>Assessment</p> <p>Teacher: The following are measures to control the spread of infectious diseases except</p> <ul style="list-style-type: none"> – Eating a balanced diet – Wash hand before and after eating – Increase hygiene measures – Drink boiled water <p>Student: Eating balance diet</p> <p>Teacher: The following are infectious diseases except</p> <ul style="list-style-type: none"> – HIV/AIDS – Malaria – Tuberculosis – Rickets <p>Students: Rickets</p>	<p>Provide opportunities for students to ask questions.</p> <p>Provide opportunities for corrective feedback or positive feedback to students.</p> <p>Records the performance of learners and verify the achievement of learning objectives.</p>

Conclusion

Teacher: We are coming to the end of our lesson. We have mainly discussed about infectious diseases which are spread through air, water, food, Vector, Soil, unprotected sexual intercourse with infected person.

Infectious diseases can be prevented through: Teaching mass people, increase public hygiene measures, immunize people against infections, Isolate infected person, Build more health care centers.

– Hope everyone has captured the key content of this lesson.

You will do the following homework to enhance your competences:

Homework:

Discuss how diseases can spread and be prevented from one person to another.

Thank you for your participation, see you next.

LESSON FROM UNIT

12

The process of sperm and ovum production

Subject: Biology	Grade: S1	Unit 12: Human reproductive system
Lesson 2: The process of sperm and ovum production		Duration: 40 minutes
Teaching and Learning materials: Charts, videos, projector, slides, flash cards, manila papers, student book of biology senior one		
SECTION/ STEPS	STEP –BY- STEP INSTRUCTIONS AND CONTENT	NOTICE TO THE TEACHER
1. Introduction (10 min)	<p>Teacher: Welcome to Biology lesson. I am sure you are going to enjoy today’s lesson. What are the reproduction systems in human?</p> <p>Student: Reproduction systems in human are female reproductive systems and male reproductive systems.</p> <p>Teacher: What are the parts of male reproductive system and female reproductive systems?</p> <p>Student: The parts of male reproductive systems are testes, penis, urethra, and accessory sex glands while these of female are ovaries, oviduct, uterus vagina, cervix, valve...</p> <p>Teacher: How are ovum and sperm formed in human?</p> <p>Student: They are formed through cell division.</p> <p>Teacher: What do you think we are going to learn?</p> <p>Student: We are going to learn process of sperm and ovum production.</p>	<ul style="list-style-type: none"> – Begin by gaining students’ attention and readiness. – Ask general questions on the new unit to know the students’ prerequisites. – Give time learners to think on asked questions and allow them to provide their answers/ expectations. – Connect the learners’ expectations related to this lesson to the key unit competence and lesson objectives.

Teacher: The lesson of today is: **sperm and ovum production.**

This lesson will allow you to attain the following objectives:

- To explain the process of ovum and sperm production.
- To compare the size of ovum and sperm.

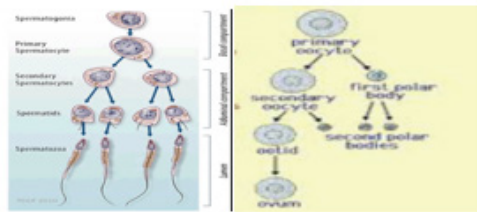
Introductory activity

Teacher: Human body grows day to day due to the different factors. During the growing period, there is the time where the boy and girl copulate and cannot give birth.

Why are not these children producing the new one when making copulation?

Student: These children may not get a new born because they have not reached the puberty period in which they can produce sperms and ova.

Teacher: Observe the picture below, then answer the following question:



1. Which terms are used for:
b) sperm production
c) egg production

Student:

- a) Process by which sperm cell and egg are made is **gametogenesis**. Sperm cell production process is **spermatogenesis**
- b) egg production process is **oogenesis**

- Ask learners the unit or lesson title.
- If learners do not announce them, announce and write them on the chalkboard.
- Communicate the lesson objectives.
- Allow learners to ask questions about the topic of the day.
- Link the learners' expectations or answers to our lesson and the key unit competence and our lesson objectives.

Give learners time to reflect on questions of introductory activity.

- Let learners to ask questions about the topic of the day and answer them.

Students must be given time to think and note down their ideas.

Teacher: Differentiate the process ovum and sperm production

Students: The difference between sperm and egg are in table below:

Production of sperm	Production of ova
Occurs in the testes of the male	Occurs in the ovaries of the female
Many sperm per germinal cell are produced	One egg cell per germinal cell is produced
Sperm are small but motile	Ova are large but non-motile
Starts at puberty and does not stop	Starts in the embryo and stops at menopause
Sperm can survive for about four days inside the female's body	An egg cell can survive for about two days inside the female's body

Always emphasize new concepts.

After each activity, remember to put an energizer/warm up to capture learners' attention for avoiding being bored It means to motivate them.

Use different questions to probe students to understand the content.

- Keep guiding learners in every step.
- Build a consensus after every activity and presentation.

If one learner gets wrong, invite another to continue.

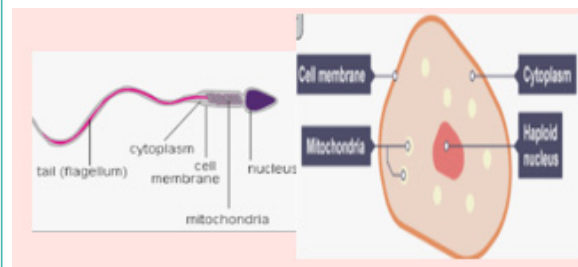
- Write on chalkboard the learners' answers.
- Guide them until the whole formation of ovum and production of sperm explained well.

2. Lesson Development

25 min

Learning activity 1:

Teacher: Observe diagram that follow then answer the questions below:



1. What are the main parts of the sperm and the ovum?
2. Why the sperm and the ovum have the different sizes and shapes?

Student:

1. The main parts of the sperm are the following: head, middle piece and tail. The main parts of the ovum are the following: nucleus, cytoplasm and graafian follicle cells.
2. The sperm and the ovum have different sizes and shapes because of their functions and their movement.

Learning activity 2:

Teacher: After analyzing the structure of sperm and ovum, answer the following questions:

- Explain the production of sperm and the formation of ovum using above displayed figures.

Student: The following is the process of sperm production: The sperms are produced in the testis by actively dividing cells in a process called spermatogenesis. The sperms produced are released into semen, which is a fluid produced by accessory glands. On other side, the ovum is formed in the following process: Ovum is produced in the ovary by actively dividing cells in a process called oogenesis. Each ovary produces one ovum in alternate months.

Provide opportunities for students to ask questions.

The application activity helps learners to relate what they have learnt to real life experience

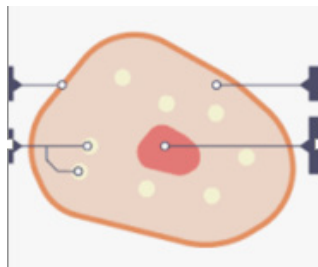
- Allow learners to present their answers
- Teacher orients the learner's answers.

Application Activity:

Teacher: The eggs of birds are relatively much larger than those of mammal. Suggest reason to account for the difference.

Student: The egg of bird is larger than that of mammal because in birds the embryo develops externally. It is totally dependent on food stored in the egg for its nourishment, while in mammals the embryo receives nourishment from the mother through the placenta.

Teacher: observe the diagrams below answer the following questions

**A****B**

As you observed the given figures **A** and **B**, which one is able to move faster? Why?

Student: B is able to move faster than A . Because B present the tail which used to move.

Lesson summary:

The sperm produced as in the following process: The sperms are produced in the testis by actively dividing cells in a process called spermatogenesis. The sperms produced are released into semen, which is a fluid produced by accessory glands while The ovum is formed in the following process: Ovum is produced in the ovary by actively dividing cells in a process called oogenesis. Each ovary produces one ovum in alternate months

Production of sperm	Production of ova
Occurs in the testes of the male	Occurs in the ovaries of the female
Many sperm per germinal cell are produced	One egg cell per germinal cell is produced
Sperm are small but motile	Ova are large but non-motile
Starts at puberty and does not stop	Starts in the embryo and stops at menopause
Sperm can survive for about four days inside the female's body	An egg cell can survive for about two days inside the female's body

Provide opportunities for corrective feedback or positive feedback to students.

Records the performance of learners and verify the achievement of learning objectives.

If possible, take records of their performance after formative assessment and verify the achievement of learning objectives.

3. Assessment, and Conclusion
(5 mins)

Assessment Questions

Teacher: What is Spermatogenesis

Student: Spermatogenesis is a process of producing the sperms in the testis.

Teacher: What does mean Ovulation?

Student: Ovulation is a process of releasing the ovum from the ovary to the oviduct

Conclude the lesson by announcing the key subtitles and giving a homework to students.

Conclusion

Teacher: We are coming to the end of our lesson. We have discussed the process of ovum and sperm where Production The sperm produced as in the following process: The sperms are produced in the testis by actively dividing cells in a process called spermatogenesis. The sperms produced are released into semen, which is a fluid produced by accessory glands while The ovum is formed in the following process: Ovum is produced in the ovary by actively dividing cells in a process called oogenesis. Each ovary produces one ovum in alternate months. Hope everyone has captured the key content of this lesson.

You will do the following homework to enhance your competences:

Homework

- You have learnt other units where there is some organisms which have tail (flagellum), state two of them.
- What is the role of semen?
- What is fertilization?
- What happen if the oviduct is cut off?

I thank you again for your attention and you're polite. See you later.

LESSON FROM UNIT

13

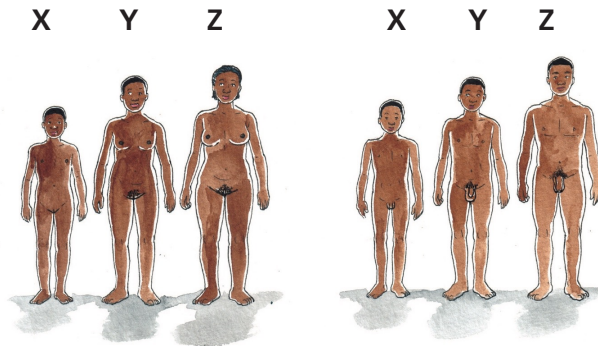
Concept of puberty

Subject: Biology	Grade: S1	Unit 13 : Puberty and Sexual maturation
Lesson title: Concept of puberty		Duration: 40 minutes
TEACHING AND LEARNING MATERIALS: Charts, manila papers, text book, chalk and chalk board.		
SECTION	STEP –BY- STEP INSTRUCTIONS AND CONTENT	NOTICE TO THE TEACHER
Introduction (12 min)	<p>Teacher: Welcome to Biology lesson. I am sure you are going to enjoy today's lesson. Who can tell us the importance of sex in human being?</p> <p>Student: Sex helps in sexual reproduction</p> <p>Teacher: When does a person becomes sexually mature?</p> <p>Student: A person becomes sexually mature during puberty</p> <p>Teacher: What do you think we are going to learn?</p> <p>Student: We are going to learn puberty.</p> <p>Teacher: Yes; we are going to start new unit called " Puberty and sexual maturation"</p> <p>The key unit competence of this unit is "To be able to analyze the physical; emotional and social changes related to puberty"</p> <p>The lesson of today is the concept of puberty</p>	<ul style="list-style-type: none"> – Begin by gaining students' attention and readiness. – Ask general questions on the new unit to know the students' prerequisites. – Give time learners to think on asked questions and allow them to provide their answers. – Connect the learners' expectations related to this lesson to the key unit competence and lesson objectives.

This lesson will allow you to attain the following objectives:

- Define puberty and how it affects the body emotionally and physically
- State the key emotional and physical changes during puberty
- Analyze the physical, emotional, and social changes associated with puberty between girls and boys
- Show respect for diversity in when and how peers develop and change during puberty.

Teacher: Present to learners the figure that shows the changes occurring in both males and female from childhood to adulthood.



Observe the figure carefully and answer the following questions:

The letter X, Y, and Z represent some stages of human development. Name them.

Student: X stands for childhood, Y stands for puberty, Z stands for adult hood

Teacher: Differentiate between primary sexual characteristics from secondary sexual characteristics.

Student: Primary sexual characteristics are present at birth but secondary sexual characteristics develop later after birth.

- Ask learners the unit or lesson title.
- If learners do not announce them, announce and write them on the chalkboard.
- Communicate the key unit competence and lesson objectives.
- Allow learners to ask questions about the topic of the day.
- Give time learners to think on he asked questions and allow them to provide their answers.
- Connect learners 'expectation with the key unit competence.
- Communicate the unit title: "
- Communicate the lesson title: of puberty
- Communicate the lesson objectives

Learning activity 1

Teacher: In groups, talk about changes that occur in boys and girls during their teenage years. Then, answer these questions.

1. Are teenagers treated differently to people of other ages? If so, talk about ways in which they are treated differently.
2. Are girls and boys treated differently from one another when they are teenagers? If so, how?
3. Are there educational opportunities for teenagers in Rwanda? How do these compare to opportunities that were available ten years ago?
4. Do teenagers have any responsibilities? If so, what does society expect of them?

Students' presentation

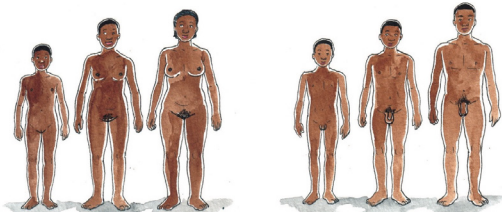
1. Yes, they require more guidance; they are at risks of meeting with people who can deliver them into temptations.
2. Yes, the changes that occur from boys and girls during teenage are different; as they are different also they are treated in different ways. For example, if a girl starts to menstruate, she need to be explained what is going on and how to deal with it by providing deep explanation and providing materials for hygiene purpose for that period.
3. Yes, there are, now days every child with school age must attend the schools this is different from ten years ago. Many schools were built and many Mathematics and Sciences combinations were established.
4. Yes, teenagers have responsibilities. The society expects them to be good citizen that will serve the nation in future. They are requiring to attend schools to be educated, they required to be problem solver and innovative in the society.

- Present to learners the figure that shows the changes occurring in both males and female from childhood to adulthood.
- Give time learners to think on the asked questions and allow them to give the answers.
- Link learners' expectations related to this lesson to the key unit competence and lesson objectives.
- Learners must be given time to think and note down their ideas.
- Emphasize new concepts in colored chalk, marker or pen
- At each step, make a pause for students to think and say or write their ideas

2. Lesson Development
(25 min)

Learning activity 2

Teacher: Answer the following questions using the figure below:



- a) What do you understand by sexual characteristics?
- b) Differentiate primary sexual characteristics from secondary sexual characteristics
- c) What do you understand by the term "puberty"?
- d) Does puberty start at the same age from boys and girls? If no, at which age does it start from boys and girls?

Students' presentation

- a) Sexual characteristics are features possessed by organisms that make them to be males or females.
- b) Primary sexual characteristics are physical characteristics that indicate whether a person is male or female. These characteristics are present from birth, for example a penis or vagina but secondary sexual characteristics develop only at puberty. For example, in males, the testes begin to produce the hormone testosterone during puberty. It brings about the development of male secondary sexual characteristics. In females, the ovaries begin to produce the hormone oestrogen during puberty. It brings about the development of female secondary sexual characteristics.
- c) Puberty is the time when boys and girls become sexually mature.
- d) No, in boys it starts between the age of 12 and 15. In girls it starts from the age between 11 and 14. It is possible that puberty can start in the early age below the stated ones.

- Learners should be arranged into groups by respecting gender responsive pedagogy.
- Always remember to provide the time for learners to think and present their findings.
- Be sensitive to the issues raised as these may be difficult for some shy learners to discuss

Learning activity 3

Teacher: Again from the presented figure above use it to answer the following questions:

- a) Identify physical and emotional changes that takes place during puberty in both
- b) Ask learners to differentiate puberty in boys and girls.

Students' presentation

a) i) **Emotional changes that occur during puberty in both girls and boys**

1. Feeling overly sensitive
2. Looking for an identity
3. Feeling uncertain
4. Peer pressure
5. Conflicting thought
6. Mood swings
7. Feeling conscious about self
8. Getting sexual feelings.

b) ii) **Physical changes occurring in both girls and boys during puberty**

1. Pubic and under arm hair starts growing
2. Body size increases
3. Acne may occur
4. Sex organs increase

- Present to learners the figure that shows the changes occurring in both males and female from childhood to adulthood.
- Always remember to provide the time for learners to think and present their findings.
- Be sensitive to the issues raised as these may be difficult for some shy learners to discuss

Differences between puberty in boys and girls

Changes in boys

- Facial hair starts growing
- Chest enlarges
- Voice deepens
- Body size increases and becomes more muscular
- Sperm are produced in the testes
- Wet dreams

Changes in girls

- No facial hair
- Breasts enlarge
- Voice becomes soft
- Fatty tissue is deposited on the hips and thighs
- Ova are released from the ovaries
- Hips broaden
- Menstruation starts

Application activity:

Teacher: There is a misconception in some teenagers saying that making sexual intercourse can heal acne. How can you help them to overcome that misconception that can result in unwanted pregnancies and sexually transmitted diseases?

Students: Acne may occur at puberty and this is normal and sexual intercourse cannot contribute in healing it.

SUMMARY

- Sexual characteristics are features possessed by organisms that make them to be males or females.
- Primary sexual characteristics are physical characteristics that indicate whether a person is male or female. These characteristics are present from birth, for example a penis or vagina but secondary sexual characteristics develop only at puberty. For example, in males, the testes begin to produce the hormone testosterone during puberty. It brings about the development of male secondary sexual characteristics. In females, the ovaries begin to produce the hormone oestrogen during puberty. It brings about the development of female secondary sexual characteristics.

- Provide enough time for learners to respond to the asked questions
- Allow learners to present their findings and write on the chalkboard what they present.

- Make sure that learners' misconceptions about acne were addressed.
- Use students' answers to make the lesson summary

- Puberty is the time when boys and girls become sexually mature.

Emotional changes that occur during puberty in both girls and boys

- Feeling overly sensitive
- Looking for an identity
- Feeling uncertain
- Peer pressure
- Conflicting thought
- Mood swings
- Feeling conscious about self
- Getting sexual feelings.

Physical changes occurring in both girls and boys during puberty

- Pubic and under arm hair starts growing
- Body size increases
- Acne may occur
- Sex organs increase

Differences between puberty in boys and girls

Changes in boys	Changes in girls
- Facial hair starts growing	- No facial hair
- Chest enlarges	- Breasts enlarge
- Voice deepens	- Voice becomes soft
- Body size increases and becomes more muscular	- Fatty tissue is deposited on the hips and thighs
- Sperm are produced in the testes	- Ova are released from the ovaries
- Wet dreams	- Hips broaden
	- Menstruation starts

3. Assessment and Conclusion

Assessment

Formative assessment

Teacher: What do you understand by the term puberty?

Student: Puberty is a time of sexual maturation that leads to physical and emotional changes.

- Puberty is a time in a person's life when he or she develops secondary sexual characteristics.

Teacher: List at least two emotional and two physical changes that take place during puberty.

Student: Two emotional changes: Feeling overly sensitive, Looking for an identity

- Two physical changes: Pubic and under arm hair starts growing, Body size increases

Teacher: These are the secondary sexual characteristics in girls except.

- A. Growth of pubic hair and breast enlarge.
- B. Hips broaden and menstrual starts.
- C. Ova are released from the testicles and acne may occur.
- D. Fatty tissue is deposited on the thighs and the hips.

Student: C

Teacher: These are the secondary sexual characteristics in boys except.

- A. Facial and pubic hair starts to grow.
- B. Voice deepens and body size increases
- C. Sex organs increase in size and acne may occur.
- D. Sperm are produced in the ovaries and underarm hair starts to grow.

Students: D

- Assess learners based on the key question verify the achievement of learning objective
- Conclude the lesson by making the review of the lesson learnt
- Give home work

Teacher: What would happen if some fails to be sexually mature?

Student: If someone fails to be sexually mature she/he not able to reproduce.

Conclusion

We are coming to the end of our lesson. As we conclude, let's review some of the key points that we have learnt about:

Puberty and emotional and physical changes that take place during puberty. We have seen the differences between primary and secondary sexual characteristics. Primary sexual characteristics are present at the birth and determine someone's gender while secondary sexual characteristics develop later during puberty. Also we have seen the differences and similarities in boys and girls during the puberty.

Now let me give you a homework assignment so that you will try to apply some of what we have learned today.

1. Explain the difference between primary sexual characteristics and secondary sexual characteristics.
2. Does puberty start at the same times in all girls. Explain your answer.

LESSON FROM UNIT

14

Sexual intercourse and fertilization

SUBJECT: BIOLOGY AND HEALTH SCIENCES | GRADE: S1 | UNIT 14: Reproduction, Pregnancy and Child birth

LESSON TITLE: Sexual intercourse and fertilization | Duration: 40 min

TEACHING AND LEARNING MATERIALS: Charts and drawings of process of fertilization, egg and sperm cell, manila papers chalkboard and chalk, duster, markers and textbooks.

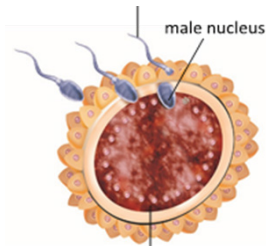
SECTION	STEP –BY- STEP INSTRUCTIONS AND CONTENT	NOTICE TO THE TEACHER
1. Introduction (5 min)	<p>Teacher: Welcome to Biology lesson. I am sure you are going to enjoy today's lesson. What is the name given to the male and female sex organs?</p> <p>Student: The male sex organ is penis, the female sex organ is vagina</p> <p>Teacher: What is the function of sex organs?</p> <p>Students: Sex organs are used in sexual reproduction, they are used also to bring sexual pleasure</p> <p>Teacher: what do you think we are going to learn?</p> <p>Students: We are going to learn reproduction.</p> <p>Teacher: Good, we are going to start new unit called “Reproduction, Pregnancy and Child birth”</p> <p>The key unit competence of this unit is “ To be able to analyze the process of reproduction, pregnancy and childbirth”</p>	<ul style="list-style-type: none"> – Begin by gaining students’ attention and readiness. – Ask general questions on the new unit to know the students’ prerequisites. – Give time learners to think on asked questions and allow them to provide their answers/ expectations. – Connect the learners’ expectations related to this lesson to the key unit competence and lesson objectives.

The lesson of today is **Sexual intercourse and fertilization**.

This lesson will allow you to attain the following objectives:

- Explain what is sexual intercourse or copulation?
- Explain what is fertilization?

Teacher: Dear learners, observe the following chart/drawing.



What do you observe from the chart?

Student: We are observing sperms and ovum, sperms trying to penetrate the ovum.

Teacher: What do you think had happened before? And what is happening now?

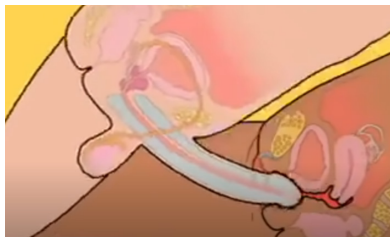
Student: Before there was sexual intercourse. And now there is fertilization.

- Ask learners the unit or lesson title.
- If learners do not announce them, announce and write them on the chalkboard.
- Communicate the key unit competence and lesson objectives.
- Allow learners to ask questions about the topic of the day.
- Motivate them and raise their interest in following carefully the lesson such that they can answer the key questions.
- Present to the learners the chart/drawing that shows male and female gametes.
- Provide the time for them to think and share the ideas
- Formulate groups which are gender responsive

2. Lesson Development (25 min)

Activity 1

Teacher: Observe the diagram below and answer asked questions:



- What is the meaning of sexual intercourse?
- Explain how sexual intercourse takes place.

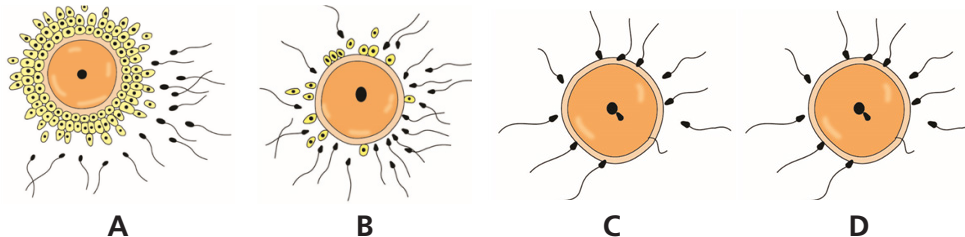
Students' presentation

- a) Sexual intercourse is the sexual contact between individuals involving penetration of a man's erect penis into a woman's vagina.
- b) Sexual intercourse occurs when the penis is inserted into the vagina and ejaculation takes place. The male sex cells, or sperms are produced in the testes of male reproductive system. The sperms need to be transferred to the inside of the female body to enable one of them to fuse with the ovum. This takes place during sexual intercourse. Sexual arousal occurs when a man and a woman interact and their senses are stimulated. The pulse rate, breathing rate and blood pressure increase. The male penis fills with blood and becomes erect. The external female reproductive parts become sensitive to touch and the vagina secretes mucus for lubrication during intercourse. The erect penis is placed inside the vagina. In the male, the movement of the penis inside the vagina stimulates a reflex and causes **ejaculation**. This is a rhythmic muscular contraction of the male reproductive system from testes to the penis. It results in the release of the semen from the urethra. Male orgasm happens at the same time as ejaculation. In female, the movement of the penis also leads to orgasm. An **orgasm** is the peak of

Sexual arousal and is a combination of pleasurable physical and emotional sensations.

Activity 2

Teacher: Observe the diagram below and answer asked questions:



- Present to the learners the chart showing the process of copulation/sexual intercourse
- Provide the time for them to think and share the ideas
- Be sensitive to the issues raised as these may be difficult for some shy learners to discuss
- Allow learners to present
- Learners must be given time to think and note down their ideas.

At each step, make a pause for learners to think and say or write their ideas.

- a) What do letters A, B,C, D represent?
b) Explain the process of fertilization.

Students' presentation

- a) 1. The letter A represents the meeting of ovum with the sperm
2. The letter B represents the dispersion of follicle cells
3. The letter C represents the penetration of the head of the sperm cell into the egg membrane
4. The letter D represents the fusion of the sperm nucleus and ovum nucleus
- b) The process of fertilization occurs in four stages those are meeting of sperm and ovum, dispersion of follicle cells, penetration of the head of sperm into the membrane of the ovum. Fertilization is defined as the union of the sperm and ovum to give zygote. Fertilization takes place in fallopian tube.

- Present to the learners the charts that represent the process of fertilization in human.
- Ask learners to respond to the asked questions and present their answers
- Connect learners' answers with the content

Application activity:

Teacher: The male sex cells or sperm need to be transferred to the inside of the female by sexual intercourse to enable one of them to fuse with the ovum in the process of fertilization.

- a) Is it common for all animals?
b) Explain your answers

Students' presentation

- a) No.
b) Some aquatic animals like fish and amphibians like frog do the external fertilization by which the female lays eggs then after the male sprays sperms on eggs to fertilize them.

LESSON SUMMARY:

- Sexual intercourse is the sexual contact between individuals involving penetration of a man's erect penis into a woman's vagina.
- Sexual intercourse occurs when the penis is inserted into the vagina and ejaculation takes place. The male sex cells, or sperms are produced in the testes of male reproductive system. The sperms need to be transferred to the inside of the female body to enable one of them to fuse with the ovum. This takes place during sexual intercourse. Sexual arousal occurs when a man and a woman interact and their senses are stimulated. The pulse rate, breathing rate and blood pressure increase. The male penis fills with blood and becomes erect. The external female reproductive parts become sensitive to touch and the vagina secretes mucus for lubrication during intercourse. The erect penis is placed inside the vagina. In the male, the movement of the penis inside the vagina stimulates a reflex and causes ejaculation. This is a rhythmic muscular contraction of the male reproductive system from testes to the penis. It results in the release of the semen from the urethra. Male orgasm happens at the same time as ejaculation. In female, the movement of the penis also leads to orgasm. An orgasm is the peak of sexual arousal and is a combination of pleasurable physical and emotional sensations
- The process of fertilization occurs in four stages those are meeting of sperm and ovum, dispersion of follicle cells, penetration of the head of sperm into the membrane of the ovum. Fertilization is defined as the union of the sperm and ovum to give zygote. Fertilization takes place in fallopian tube.

- Use students 'answers to make the lesson summary
- Assess learners based on the key question verify the achievement of learning objective

3.

Assessment and conclusion
(5 min)

Assessment

Teacher: Fertilization is:

- A. Movement of sperms from vagina to the uterus
- B. Union of male and female
- C. Movement of sperms towards oviduct
- D. Union of ovum and sperm nuclei.

Students: D

Teacher: The best definition of copulation is:

- A. Copulation is sexual intercourse
- B. Copulation is coitus
- C. Copulation is the process of fertilization
- D. Copulation is the process of inserting an erect penis into vagina

Students: D

Conclusion

We are now at the end of our lesson. Let me remind what we have learnt. We have seen the process of fertilization and sexual intercourse; we have seen also the stages of fertilization. Please keep reversing and where you will meet with difficulties you are allowed to ask for more explanations.

Thank you for our participation in this lesson

Teacher: Fertilization takes place in:

- A. Vagina
- B. Fallopian tube.
- C. Uterus
- D. Testis.

Students: B

– Conclude the lesson

SAMPLE SCRIPTED LESSONS OF BIOLOGY S2

LESSON FROM UNIT

1

General Characteristics of Animals

Subject: Biology and Health Sciences	Grade: S2	Unit 1: Classification of Kingdom Animalia
Lesson Title: General Characteristics of Animals	Duration: 40 Min.	
Teaching and Learning Materials: Pictures of Specific Animals, Textbooks, Chalkboard and Chalk		
SECTION	STEP –BY- STEP INSTRUCTIONS AND CONTENT	NOTICE TO THE TEACHER
1. Introduction (8 min)	<p>Teacher: Hello learners! Welcome to Biology lesson. I am sure you are going to enjoy today's lesson. Can you give some examples of animals?</p> <p>Student: Some examples of animals are: cows, hen, goat, sheep, dog, cat, bat, lion, ect.</p> <p>Teacher: How are animals different from each other?</p> <p>Student: Animals differ from each in different ways: some animals have wings while others they do not have. Some have wings while others they do not have. Animals have different ways of movement; animals are able to respond to the external stimuli.</p> <p>Teacher: What do you think we are going to learn?</p> <p>Student: We are going to learn characteristics of animals</p> <p>Teacher: Good! We are going o begin new unit called "Classification of Kingdom Animalia"</p>	<ul style="list-style-type: none">– Begin the lesson by welcoming learners and gain their attentions.– Ask general questions on the new unit to know the students' prerequisites.– Give time learners to think on asked questions and allow them to provide their answers/ expectations.

The key unit competence of this unit is “ To be able to classify animals into their main groups based on their external features”

The lesson of today is general characteristics of animals.

This lesson will allow you to attain the following objectives:

- State the general characteristics of all animals.
- Identify unique features that distinguish animals from organisms in the other kingdoms.

Teacher: Dear learners in senior one you have learnt about biodiversity and classification of organisms in the environment.

Can you recall the five kingdom of classification and the main features of each kingdom?

Student: The five kingdom of classification are :

1. Kingdom Animalia

Main characteristics: are multicellular, heterotrophic, and movement.

2. Kingdom plantae.

Main characteristics: are multicellular, autotrophic, cannot move the whole body parts.

3. Kingdom fungi.

Main characteristics: are heterotrophic, reproduce by means of spores.

4. Kingdom protocista.

Main characteristics : they are single celled organisms/ unicellular

5. Kingdom monera

Main characteristics: they are unicellular, are prokaryotic.

Teacher: Dear students, are all animals the same?

Student: No. All animals are not the same.

- Connect the learners’ expectations related to this lesson to the key unit competence and lesson objectives.
- Ask learners the unit or lesson title.
- If learners do not announce them, announce and write them on the chalkboard.
- Communicate the key unit competence and lesson objectives.
- Allow learners to ask questions about the topic of the day.
- Ask learners to recall the five kingdom of classification.
- Learners must be given time to think and respond to the asked question.
- Ask learners some probing questions

Teacher: Can you give some differences among animals?

Student: Some animals have wings while others they do not have, some move by four legs while other have two, some animals breast feed while others they do not, some live in water while others live on land.

Teacher: What do the answers to the above questions tell you about the diversity of animals?

Student: The above answers indicate there are many different animals on earth.

Teacher: observe this picture below and answer the following question:



What is the name of organism does the picture represent?

Student: The above picture represents the bee.

Teacher: List down all its external features you are observing from the above picture.

Student: The external features of the above organism are:

- It has three body parts.
- It has wings
- It has 6 legs
- It has two eyes
- It has two antennae
- It has segments on its body.

“What are the general characteristics of animals?”

- Show students a picture of an animal and ask some questions about it.
- Allow time for students to respond about the asked questions

2. Lesson Development

(25 min)

Teacher: We are going to formulate groups; each group should have four members (Maximum). If possible two boys and two girls.

In your groups discuss about the following picture.



- What are you observing from the picture?
- Name the organisms from A to F.
- Are all these animals looking like?
- What are the features you can use to classify animals?
- What is the meaning of the following terms?
 - Eukaryotic
 - Multicellular
 - Heterotrophic

- Help learners to formulate the group.
- Present a picture of animals and ask learners to discuss to the asked questions and present their findings
- Learners must be given time to think and note down their ideas.

Students' presentation

a) In the picture we are observing different animals.

b) The organisms A-F are:

A: Newt

D: Bird

B: Fish

E: Man

C: Snake

F: Cow

c) No, animals have different number of legs and different number of wings

d) The main features used to classify animals include:

- Presence or absence of appendages /legs (An appendage is a projection from the body of an organism), their type and number.
- The body form; whether segmented or unsegmented.
- Presence of skeleton and its type; exoskeleton or endoskeleton.
- Type of body symmetry either bilateral or radial

e) Eukaryotic is an organism made up of cell with true nucleus, it means membrane bound with other organelles.

- Multicellular is an organism made up of many cells.
- Heterotrophic organism is an organism depending on other organisms for food.

Teacher: Try to find the general characteristics of animals.

Student: The general characteristics of animals are:

1. They are multicellular organisms.
2. They have eukaryotic cells.
3. Their cells are differentiated into tissues and organs.
4. They are all heterotrophic, meaning they depend on other organisms for food.
5. Their cells lack cell walls, cell sap and chloroplasts. They only have cell membranes and this makes their cell to be irregular in shape

- Allow learners to present
- Ask learners to try to find the general characteristics of animals
- Relate students 'answers and the content
- Help learners to relate what they have learnt to real life experience by answering and discussing about the asked questions.

Application activity:

Teacher: 1. Use your knowledge on general characteristics and differentiate the following animals in terms of movement and habitat.

- a) fish and human
- b) eagle and tiger

2. Movement is one of common characteristics for all animals. What is the importance of movement to animals?

Students' presentation

1. a) Fish lives in water but human lives on land. Fish moves by swimming while human can walk or run
b) Eagle moves by flying but tiger moves by running or walking.
2. Movement is important for animals as it help them to escape predators, search for food (because they are heterotrophic organisms) search for suitable microhabitat and help regulate internal factors such as water, temperature, etc.

LESSON SUMMARY:

The main features used to classify animals include:

- Presence or absence of appendages /legs (An appendage is a projection from the body of an organism), their type and number.
- The body form; whether segmented or unsegmented.
- Presence of skeleton and its type; exoskeleton or endoskeleton.
- Type of body symmetry either bilateral or radial

	<p>The general characteristics of animals are:</p> <ol style="list-style-type: none"> 1. They are multicellular organisms. 2. They have eukaryotic cells. 3. Their cells are differentiated into tissues and organs. 4. They are all heterotrophic, meaning they depend on other organisms for food. 5. Their cells lack cell walls, cell sap and chloroplasts. They only have cell membranes and this makes their cell to be irregular in shape 	
<p>3. Assessment & Conclusion (7min)</p>	<p>Assessment</p> <p>Teacher: Give at least four general characteristics of animals</p> <p>Student: General characteristics of animals are: multicellular organisms, have eukaryotic cells, are heterotrophic organisms, are able to move, they respond to the external stimuli, etc.</p> <p>Teacher: Animals are heterotrophic organism. What do you understand by heterotrophic organism?</p> <p>Student: Heterotrophic organisms are organisms which depend on other organisms for food.</p> <p>Teacher: What are the two main features that can be used to classify animals?</p> <p>Student: Presence or absence of skeleton, number of legs, body symmetry, etc.</p> <p>Teacher: Enumerate 2 unique features that distinguish animals from organisms in the other kingdoms</p> <p>Student: The unique features that distinguish animals from organisms in other kingdoms are: Sensitivity and locomotion</p>	<ul style="list-style-type: none"> – Use students 'answers and improve them to make the lesson summary – Assess learners based on the key question to verify the achievement of learning objectives. – The assessment should be individually provided to make sure that all learners were assessed

	<p>Teacher: Movement is one characteristic of animals. What would happen if animals will not able to move?</p> <p>Student: If animals will not be able to move; They will not be able to find food and finally die.</p>	
	<p>Conclusion</p> <p>We are coming to the end of our lesson. As we conclude, let's review some of the key points that we learned about general characteristics of animals. We have seen that animals are able, to respond to the external stimuli, are made up of many cells, and they depend on other animals for food, animals have eukaryotic cells.</p> <p>HOMEWORK:</p> <p>Give five classes of phylum chordata.</p>	<ul style="list-style-type: none"> - Conclude the lesson learnt - Give home work

LESSON FROM UNIT

2

Food Chains and Food Webs

SUBJECT: BIOLOGY AND HEALTH SCIENCES		GRADE: S2	UNIT2: ENVIRONMENTAL BIOLOGY
Lesson Title: Food Chains and Food Webs		Duration: 40 min	
TEACHING AND LEARNING MATERIALS: Charts representing some feeding relationships, pictures of animals, manila papers, markers, chalkboard and chalk, textbooks.			
SECTION	STEP –BY- STEP INSTRUCTIONS AND CONTENT		NOTICE TO THE TEACHER
1. Introduction (8 min)	<p>Teacher: Hello learners! Welcome to Biology lesson. I am sure you are going to enjoy today's lesson. Can you remind what we have seen last time?</p> <p>Student: Last time we have seen the concept of ecology.</p> <p>Teacher: Good! Can you recall some terms used in ecology that we have seen.</p> <p>Student: Some terms that we have seen include: Ecology, food chains, food webs, ecosystem, habitat, etc.</p> <p>Teacher: Wonderful! What is food chain?</p> <p>Student: Food chain is the showing of the transfer of energy from one organism to the next beginning with the producers.</p> <p>Teacher: What is food web?</p> <p>Student: Food web is the network of interconnected food chains.</p> <p>Teacher: Can you guess the lesson title of today?</p> <p>Student: The title of today's lesson is " food chains and food webs"</p>		<ul style="list-style-type: none"> – Begin the lesson by welcoming learners and gain their attentions. – Help learners to review the previous lesson. – Help learners to find the title of the lesson using questions – Communicate lesson objectives.

Teacher: You are right! The lesson of today is " food chains and food webs"

This lesson will allow you to attain the following objectives:

- Naming components of food chains
- Carrying out analysis of the diagram showing a food chain
- Construct and interpret simple food chains and food web
- Differentiate food chains from food web.
- Appreciate the importance of interdependence of living things.

Introductory activity

Teacher: Observe the following printed image. How many types of animals are in the picture?



Student: In the picture there are two types of animals.

Teacher: What does the picture represent?

Student: The picture represents the feeding relationship in wild life.

Teacher: How many feeding relationships found in the above picture?

Student: There are three feeding relationship: producer (grasses), herbivore (buffalo), carnivore (lions)

" Differentiate food chain from food web"

- Present the picture to learners and ask them to observe and respond to the asked questions.
- Learners must be given time to think and note down their ideas.
- Provide corrective feedback for wrong response
- At each step, make a pause for learners to think and say or write their ideas.

Learning activity 1

Teacher: We are going to formulate groups; each group should have four members (Maximum). If possible two boys and two girls. Use the list of organisms below and find what they feed on. The list is made up of human, cow, cassava, peas, avocado tree, hyena, spider, saprophytic fungi.

Example: Human feeds on both plants and animals.

Students' presentation

- Cow feeds on grass
- Cassava, peas, and avocado tree make their own food.
- Hyena feeds on other animals
- Spider feeds on small insects
- Saprophytic fungi decompose dead organic matter

Teacher: Find the appropriate term for an organism that feeding on animals, plants, dead bodies of other organisms, both plants and animals and an organism which is able to make its own food:

For example: An organism that feeds on both animals and plants is called omnivore.

Then request learners to go ahead (use Biology student's book).

Students' presentation

- An organism which feeds on animals is called **carnivore**.
- An organism which feeds on plants/grass is called **herbivore**.
- An organism which feeds on dead bodies of other animals is called **decomposer**.
- An organism which is able to make its own food is called **autotroph/producer**.

Teacher: the components of food chains and food webs are: Producers, Consumers and Decomposers.

- Communicate the key question.
- Give the list of different organisms and find what they feed on.
- One example should be done for learners to guide them.
- Allow learners to present their answers
- Inform learners about the next activity about food chain and food web.
- A table of who eats whom should be provided and one example should be done for learners.

Learning activity 2

Teacher: Food chain is a linear representation of how organisms eat each other before they are eaten in return/ Food chain is the showing of the transfer of energy from one organism to the next beginning with the producers. Food web on the other hand is therefore a complex series of interconnected food chains.

Use the table below to construct possible food chains and food webs.

Organism	What it eats	Trophic level
Cat	Mouse	Consumer
Grass	Makes its own food	Producer
Potatoes	Makes its own food	Producer
Hyena	Zebra , cow	Consumer
Cow	Grass	Consumer
Zebra	Grass	Consumer
Lion	Zebra, cow	Consumer

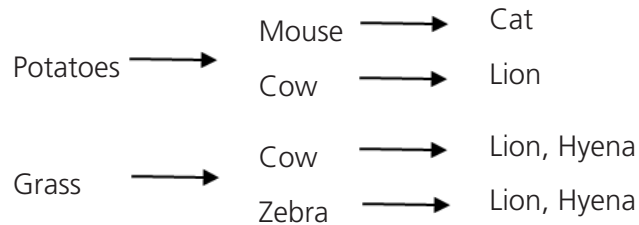
Students' presentation

Possible food chains:

Grass → Cow → Lion
Grass → Cow → Hyena
Potato → Mouse → Lion
Potato → Cow → Lion
Grass → Zebra → Hyena
Grass → Zebra → Lion

- Always remember to provide the time for learners to think and respond to the asked questions.
- Give time to learners to relate the lesson of the day with the real life situations.
- Use probing questions and students answers to summarize the lesson.

Possible food webs.



Teacher: Note that food chains and food web always begin with the producer. The position occupied by an organism on food chain and food web is called trophic level. Producers occupy the first trophic level on food chain and food web.

Application activity:

Teacher: Suppose that there is a sudden disease which comes and kill all plants on earth. How this can affect the life on earth?

Students' presentation

Plants are producers, this means that other heterotrophic organisms depend on them. When a disease comes and kills plants all organisms depending on will die.

LESSON SUMMARY

Food chain is a linear representation of how organisms eat each other before they are eaten in return/ Food chain is the showing of the transfer of energy from one organism to the next beginning with the producers. Food web on the other hand is therefore a complex series of interconnected food chains.

- An organism which feeds on animals is called **carnivore**
- An organism which feeds on plants/grass is called **herbivore**
- An organism which feeds on dead bodies of other animals is called **decomposer**
- An organism which is able to make its own food is called **autotroph/producer**

The components of food chains and food webs are: Producers, Consumers and Decomposers

- Assess learners based on the key question to verify the achievement of learning objectives.
- Provide opportunities for corrective feedback

3. Assessment & Conclusion
(6 min)

Assessment

Teacher: What do you understand by feeding relationship?

Students: Feeding relationship is the relationship between organisms which are fed upon and organisms who feed upon them.

Teacher: Define trophic level

Students: Trophic level is the position occupied by an organism on food chain and food web.

Teacher: Differentiate food web from chain

Students: Food chain is a linear representation of how organisms eat each other before they are eaten in return but is a complex series of interconnected food chains.

Teacher: Match the columns in the following table to link the description to the term.

1. Producer	A. Organisms that eat other organisms to obtain food
2. Carnivore	B. Feeds on plants and animals
3. Consumer	C. Organisms that make their own food.
4. Omnivore	D. Organisms that eat only plant material
5. Predator	E. A carnivore that eats dead animals
6. Decomposer	F. An organism which feeds on other animals (living or dead)
7. Insectivore	G. An organism that breaks down the remains of dead plants and animals
8. Scavenger	H. A carnivore that hunts other animals
9. Herbivore	I. A carnivore that eats mainly insects and other small invertebrates

Students:

C 2 → F 3. → A 4. → B 5. → H 6. → G 7. → I 8. → E 9. → D 1

- Conclude the lesson
- Give homework

Conclusion

We are coming to the end of our lesson. As we conclude, let's review some of the key points that we learned about.

We have seen the meaning of feeding relationship where it was defined as the relationship between organisms which fed upon and organisms who feed upon them. We have seen also that feeding relationships are represented by food chain and food webs. In feeding relationship we have seen that there are producers, consumers and decomposers. In consumers we have: carnivores; herbivores; insectivores; scavengers and omnivores. Food chains and food webs should always start with the producer.

Homework

Construct three examples of food chains and three examples of food web with at least three trophic levels.

Thank you for your participation in this lesson.

LESSON FROM UNIT

3

Passive movement of substances across a cell membrane

SUBJECT: BIOLOGY

GRADE: S2

DURATION: 40 Minutes

UNIT 3: Passive movement of substances across a cell membrane

Lesson Title: Passive movement of substances across a cell membrane

TEACHING AND LEARNING MATERIALS: Drawings, manila papers, chalk and chalkboard, pens, books, potatoes, sugar/salt, distilled water, straw etc

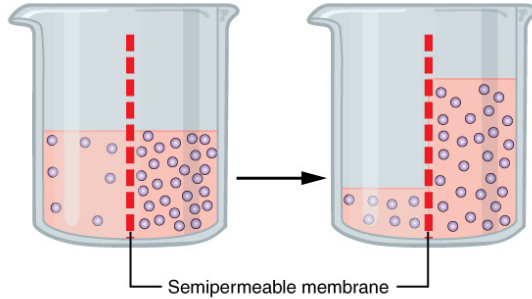
SECTION	STEP –BY- STEP INSTRUCTIONS AND CONTENT	NOTICE TO THE TEACHER
1. Introduction (10 minutes)	<p>Teacher: Welcome to Biology lesson. I am sure you are going to enjoy today's lesson. Who can tell us the definition of diffusion?</p> <p>Student: Diffusion is the movement of particles from hypertonic concentration to hypotonic concentration according to the concentration gradient.</p> <p>Teacher: What are the factors that affect the rate of diffusion?</p> <p>Student: Factors that affect the rate of diffusion are diffusion distance, temperature, concentration gradient, size of molecules, surface area to volume ratio.</p> <p>Teacher: What do you think we are going to learn?</p> <p>Student: We are going to study Osmosis.</p> <p>Teacher: Yes, we are going to start a new lesson which is osmosis</p>	<ul style="list-style-type: none">– Give time learners to think on asked questions and allow them to provide their answers/ expectations.– Check before if the chart and drawing are available.– Students must be given time to think and note down their ideas.

This lesson will help you to attain the following objectives:

- To define Osmosis.
- To describe the importance of osmosis.
- Explain turgor pressure.
- Investigate osmosis through experiments.
- Appreciate the importance of turgidity in plants.

Introductory activity

Teacher: Observe the following diagram and answer the question in your groups



What do you think on the diagram?

Student: The diagram is about osmosis.

Teacher: Define the term osmosis.

Student: Osmosis is the movement of water from hypotonic solution to hypertonic solution through a semi permeable membrane.

Teacher: Differentiate hypotonic solution from hypertonic solution.

Student: Hypotonic solution is a solution which has a low concentration while hypertonic solution is a solution which has a high concentration.

- After each activity remember to put an energizer /warm up to capture learner's attention.
- Keep guiding learners in every step.
- Build on a consensus after every activity and presentation.

Teacher: Why is osmosis a passive movement?

Student: Osmosis is a passive movement because it doesn't require cellular energy or energy from respiration.

Teacher: Observe the following figure and answer to the question.



What do you think on the diagram above?

Student: The diagram above indicates insectivorous plant (carnivorous plant) catching an insect by using osmosis phenomenon.

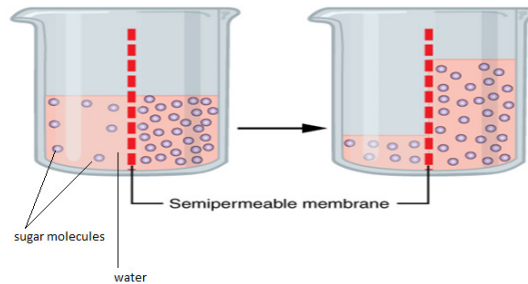
Teacher: Enumerate other functions of osmosis.

Student: Osmosis is used in the following ways: Uptake of water by roots, opening and closing of stomata, movement of water from cell to cell in tissue, feeding in insectivorous plants.

2. Lesson Development
(25 minutes)

Learning activity 1

Teacher: Observe the following figure and answer the question in your groups.



Explain why the solution in the left side of the beaker decreases while that of the right-side increases after 4 hours?

Student:

The solution in the left side of the beaker decreases after 4 hours because, it has a low concentration(it has a large number of water molecules).The solution in the right side increases after 4 hours because, it has a high concentration(it has a small number of water molecules).Remember that osmosis is the movement of water molecules from a low concentrated solution (hypotonic) to a high concentrated solution (hypertonic) through a semi permeable membrane.

Application activity

Teacher: Mutoni has cooked beans, after one hour, he observed that the saucepan was full of beans. Explain what is happening? Was the number of beans increased or not? Justify your answer.

- Allow the learners to present their answers
- Teacher orients the learners 'answers.

Student: Beans absorb water by osmosis. The number of beans does not increase, Only the volume of beans was increased.

- Students must be given time to think and note down their ideas.
- At each step, make a pause for students to think and say or write their ideas. A break or a song!
- Provide opportunities for students to ask questions.

	<p>Summary:</p> <ul style="list-style-type: none"> – Osmosis is the movement of water particles from a region of low concentration(hypotonic) to a region of high concentration(hypertonic) through a semi permeable membrane – Turgor pressure is the pressure exerted by the cell contents against a cell wall. – Osmosis is used in uptake of water by roots, opening and closing of stomata, movement of water from cell to cell in tissue, and feeding in insectivorous plants. – Plants wilt because turgor pressure is zero due to diminished water in cells of plants. 	<p>Provide opportunities for corrective feedback or positive feedback to students.</p> <p>If possible, take records of their performance and verify the achievement of learning objectives.</p>
<p>3. Assessment & Conclusion (5 minutes)</p>	<p>Assessment questions</p> <p>Teacher: Which one of the following describes osmosis.</p> <ol style="list-style-type: none"> Movement of sugar molecules. Movement of water molecules, Movement of sugar and salt molecules. Evaporation of water. <p>Student: b</p> <p>Teacher: What is the importance of osmosis?</p> <p>Student: Osmosis is used in uptake of water by roots, opening and closing of stomata, movement of water from cell to cell in tissue, and feeding in insectivorous plants.</p> <p>We are coming to the end of our lesson. Hope everyone has captured the key contents of the lesson. We have studied mainly the meaning of osmosis, the importance of osmosis, the types of solutions and the role of turgor pressure.</p> <p>You will do the following home work to enhance your competences.</p> <p>Question: Give the difference between osmosis and diffusion.</p> <p>Thank you for your participation in this lesson.</p>	

LESSON FROM UNIT

4

Concept of active transport

SUBJECT: BIOLOGY

GRADE: S2

UNIT 4: ACTIVE TRANSPORT

Duration : 40 min

Lesson 1: Concept of active transport

TEACHING AND LEARNING MATERIALS: Charts, chalk board, manila paper, text book.

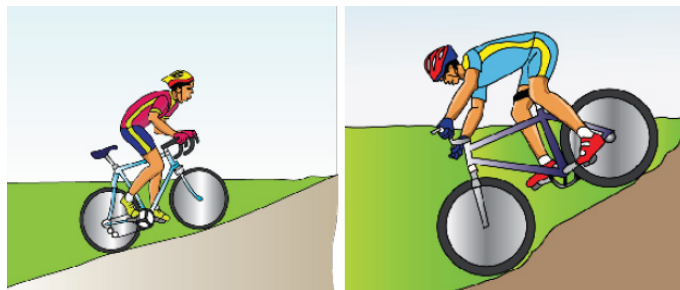
SECTION

STEP –BY- STEP INSTRUCTIONS AND CONTENT

NOTICE TO THE TEACHER

1. Introduction (10 min)

Teacher: Welcome to biology lesson, I am sure you are going to enjoy today's lesson. Observe this picture



Teacher: What tool do you see on the pictures?

Student: On every picture, there is riding bicycle.

Teacher: Which is easier between climbing uphill and going downhill?

Student: The easier is going downhill.

- Begin by gaining students' attention.
- Give learners time to think on asked questions and allow them to provide their answers.
- Give learners opportunity to reflect on the picture provided.
- Announce and write the unit title.
- Connect learners' expectations to the key unit competence.

Teacher: Why is that the case?

Student: Because it doesn't require lot of energy. The climbing uphill requires much energy. It is active movement.

Teacher: What do you think we are going to learn.

Student: We are going to learn Active transport.

Teacher: Yes we start the new unit called Active transport

The key unit competence of this unit is to be able to analyze and interpret the process of active transport and its significance to living organisms.

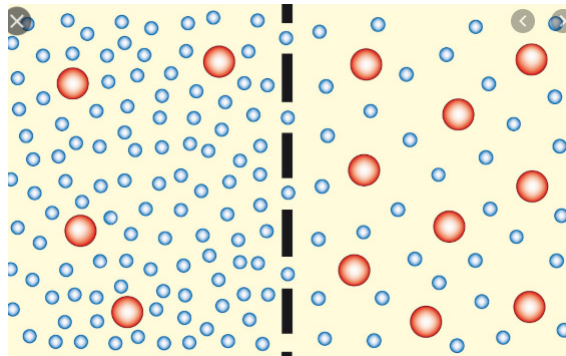
The lesson of today is concept of active transport

The lesson of today, will allow you to attain the following objectives:

- Define active transport
- Compare active transport to passive transport

Introductory Activity

Teacher: Observe carefully the diagram below. What do see on it?



Student: On the diagram there is distribution of substances on adjacent two sides.

- Announce and write the lesson title.
- Connect the learners' expectation related to this lesson to the learning objectives.
- Allow learners to ask questions about the topic of the day.
- Build on their questions and communicate the key questions.
- Give learners opportunity to reflect on the picture provided.

Teacher: Who can help us to recall what the passive transport is?

Student: Passive transport is the movement of substance from the region of high concentration to the region of low concentration without the use of energy.

Teacher: What will happen if the movement of substances moves from low to high concentration?

Student: It will be hard to move.

Teacher: Think on the following key questions and you will answer them along the lesson.

What is active transport?

What is the difference between active and passive transport

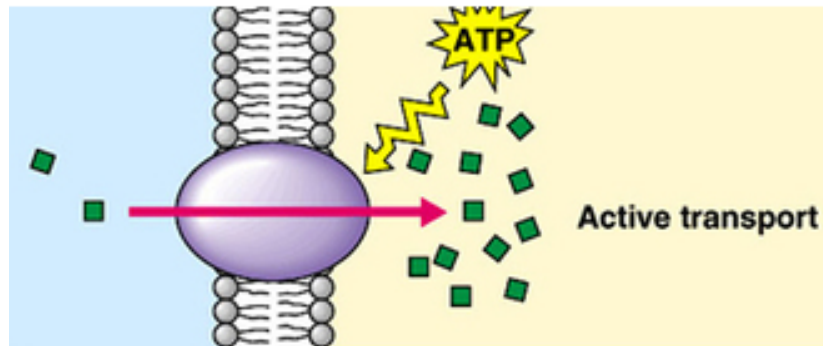
- Ask learners to explore and record their observation.
- Build on learners' ideas to expand their knowledge.
- Provide the figure to learners.
- Ask learners to explore and record their observations.
- Guide their discussions in groups

2. Lesson Development (28 min)

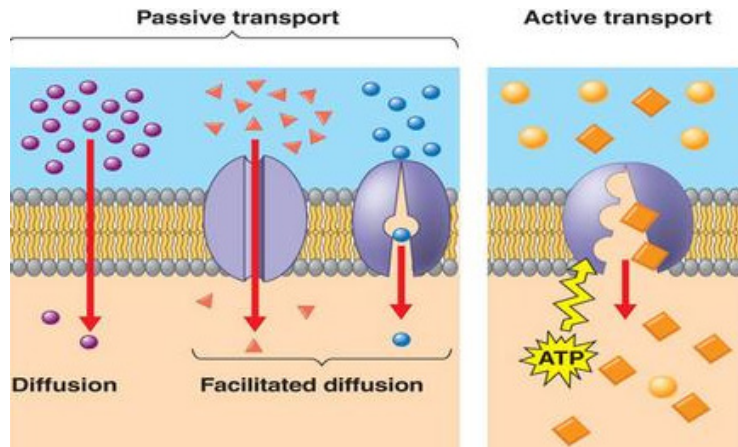
Teacher: You are going to do the group activity. Join your groups and start the work.

Activity: Discuss the following questions:

Study the diagram below and describe what is active transport.



Study carefully the diagram below and answer asked questions



- Based on your knowledge about, give any three differences between active and passive transport.
- Which among passive transport and active transport does involve osmosis and diffusion?

Student's presentation:

Active transport is the movement of particles through the cell membrane from a region of low concentration to a region of high concentration by using energy, it is described as uphill. For particles to move as indicated by arrows, energy is required. This is because particles move from low to high concentration.

Passive transport: Substances move from high concentration to low (down concentration gradient), no need of energy.

Active transport: Substances move from lower to higher concentration (against concentration gradient), energy and carrier protein required.

It is the passive transport that involve osmosis and diffusion

- Provide time to present their findings
- Orient the learner's answers as they present.
- Build a consensus after presentation of the activity.
- Guide their reasoning by probing questions.
- Provide an opportunity where students can ask questions, where the teacher can help every learner depending on his/ her special educational needs, and ask some questions leading students to summarize the lesson learnt.

Application activity

Teacher: Suppose you are assisting to a cycling game. Cyclists go uphill and downhill alternatively. Where is active movement applied? and where is passive movement applied?

Student: Going uphill is an active movement while going downhill is a passive movement

Teacher: At home we drink tea with dissolved sugar. How do sugar molecules from the tea get in our body cells to provide energy?

Student: Sugar molecules are absorbed by active transport process.

Summary

Active transport is the movement of particle through cell membrane from a region of low concentration to a region of high concentration in the body, using energy in form of ATP. The following table summarises the difference between passive transport and active transport.

Passive transport	Active transport
1. Transport of substances across cell membrane from higher to lower concentration.	1. Transport of substances across cell membrane from lower to higher concentration.
2. Does not require energy.	2. Require energy.
3. Involves osmosis and diffusion process.	3. Involves endocytosis and exocytosis.
4. Transport anything soluble: water, oxygen, carbon dioxide.	4. Transport of large molecules, ions.

3. Assessment & Conclusion
(5min)

Assessment questions

Teacher: The food we consume contains nutrients such as glucose. From intestines glucose molecules get into body cells to provide energy. By which process do you think glucose molecules move from intestines into cells?

Student: By the process of active transport from the intestines to the blood.

Teacher: Active transport requires energy.

i) Yes

ii) No

Student: Yes

Teacher : Active transport involves osmosis

i) Yes

ii) No

Students: No

Teacher : Active transport is uphill movement

i) Yes

ii) No

Student: Yes

Conclusion

Teacher: We are coming to end of our lesson. we have mainly studied the meaning of active transport and the difference between passive transport and active transport. Hope everyone has captured the key content of this lesson. You will do the following homework to enhance your competence.

a) What is the role of active transport in organisms?

b) Which factors affect active transport?

Thanks for your participation, see you next.

- Provide question by question to students.
- Every student will write the answer on the paper, and check immediately their answers.
- If possible, take records of their performance and verify the achievement of learning objectives.
- Reserve opportunity for corrective feedback to students.
- Conclude the lesson by announcing the key takeaway and giving a homework to students.

LESSON FROM UNIT

5

Test for reducing sugar

Subject: Biology	Grade: S2	Duration : 40 min
LESSON: Identification of food components.		
TEACHING AND LEARNING MATERIALS: Test tubes, test tube holder, droppers, spatula, source of heat, beaker or conical flask, labels, manila paper, chalk board, etc.		
SECTION/ STEPS	STEP –BY- STEP INSTRUCTIONS AND CONTENT	NOTICE TO THE TEACHER
1. Introduction (10 minutes)	<p>Teacher: Welcome to biology lesson. Last time we started identification of food component and we tested starch. Who can remind us the reagent used to test starch and the result obtained for a positive result</p> <p>Student: The reagent used to test starch is iodine solution. To confirm that starch is present in a food sample the brown color of iodine turns blue black</p> <p>Teacher: Distinguish between starch and glucose</p> <p>Student: Starch is a polysaccharide comprising of glucose monomers linked together whereas glucose is monosaccharide which is a reducing sugar</p> <p>Teacher: what do you think we are going to learn now?</p> <p>Student: We are going to study how to test reducing sugar</p> <p>Teacher: Yes, the title of the lesson is test for protein.</p> <p>This lesson will allow you to attain the following objectives:</p> <ul style="list-style-type: none"> To carry out food test for reducing sugars safely 	<ul style="list-style-type: none"> – Begin by gaining students’ attention and readiness. – Organize each of the items listed logically – Ask general questions on the new unit to know the students’ prerequisites. – Give time learners to think on asked questions and allow them to provide their answers/ expectations.

- To identify several foods that contain reducing sugars
- Be able to manipulate the different apparatus used during the reducing sugar taste experiment

Introductory Activity

Teacher: Based on what you learned in senior 1 unit 7 ‘Food nutrients and diet’ Give an example of a food that contains carbohydrate

Student: the food contain carbohydrate are sweet potatoes, cassava, maize, sorghum, rice, fruits

Teacher: Give the basic unit of carbohydrate

Student: Unit of carbohydrate is monosaccharide (example: glucose)

Teacher: Based on what we studied last time “test for starch” we have tested starch in food sample such as sweet potatoes. Do you think that is it the same as in sweet fruit juice extract?

Student: test of starch is not the same as the test of sweet fruit juice extract because sweet fruit juice extract contain glucose which a simple sugar whereas starch is a complex sugar but also glucose can be tested in a food sample

Teacher: Today we are starting with test of reducing sugar the lesson 2 of unit 5 which is identification of food components. It will be easy for you as you have the prerequisites needed in testing food component as last time we did for starch

- Connect the learners’ expectations related to this lesson to the key unit competence and lesson objectives.
- Announce and write lesson title on the chalkboard.
- Communicate the lesson objectives.
- Connect the learners’ expectations related to this lesson to the key unit competence and lesson objectives.
- Give learners opportunity to reflect on the activities’ questions.
- Allow learners to ask questions about the topic of the day

2. Lesson Development (25 min)

Learning activity: Test for reducing sugar

Teacher: in your groups, you are going to handle the experiment on how can we confirm that food sample contain reducing sugar. The following is the requirements and procedures that you are going to respect during this experiment

Learning activity: Test for reducing sugar

Teacher: in your groups, you are going to handle the experiment on how can we confirm that food sample contain reducing sugar. The following is the requirements and procedures that you are going to respect during this experiment

Requirements:

- Benedict’s solution
- Test tubes and test tube rack
- Glass rod and a spatula
- Dropper
- Source of heat
- Distilled water
- Labels
- Conical flask (100 cm³) or small beaker
- Motor and a pestle
- Food extracts, for example, banana juice
- Glucose, starch and sucrose solutions

Procedure:

- Using a dropper put 2 cm³ of each of the solutions to be tested into separate test tubes.
- Label the test tubes with the solutions in them
- To each test tube, add 2 cm³ of Benedict’s solution
- Heat for about two minutes and observe the color change.
- Record your observations in the table below.

Solution tested	Observations	Deduction
Glucose		
Distilled water		
Starch		
Sucrose		
Banana juice		

- Motivate them and raise their interest in following carefully the lesson such that they can answer the key question. “What confirm the food containing reducing sugar?”
- Provide the necessary materials and reagents and make sure that are distributed to all groups
- Teacher put learners into groups depending on their abilities then guide them to carry out the experiment
- Students must be given time to handle the experiment
- Always emphasize new concepts.
- The teacher request again learners to be ready and follow carefully instructions

Students results and presentation:

Solution tested	Observations	Deduction
Glucose	The blue color of Benedict's solution turns green, then to yellow and finally to brick red	Reducing sugar present
Distilled water	There is no color change; blue color of Benedict's solution remains	Reducing sugar not present
Starch	There was no color change	Reducing sugar not present
Sucrose	There is no color change; blue color of Benedict's solution remains	Reducing sugar not present
Banana juice	The blue color of Benedict's solution turns green, then to yellow and finally to brick red	Reducing sugar present

Teacher: How can we prove that provided sweet fruit juice extract (test sample) contain reducing sugar?

Student: Benedict's solution is the chemical reagent used to test for the presence of reducing sugars. When boiled with glucose, which is a reducing sugar, an orange precipitate forms.

A change in color from blue to green, yellow, orange and finally red indicates the reducing sugar. The depends on the amount of reducing sugar present

- Teacher asks a learner to present their findings/ answers.
- Note on the chalkboard what the learner present.
- - Build on learners' ideas to expand their knowledge.
- Use different questions to probe students to understand the content.
- Keep guiding learners in every step and give help where necessary
- Build a consensus after presenting results of experiment

Application activity:

Teacher: Suggest ways of identifying reducing sugar among different food samples

Student:

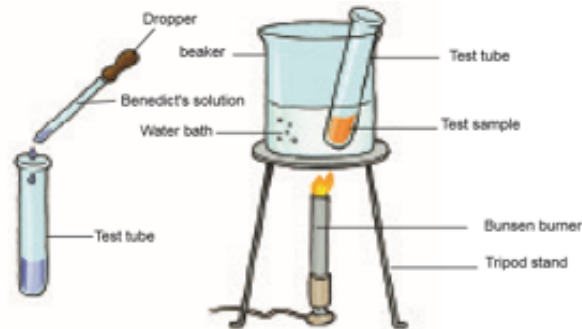
To identify food containing reducing sugar among different food samples, you add Benedict's solution to each sample and make observation. The sample that turns blue color of Benedict's solution to green, yellow, orange and finally red is the one that contain reducing sugar

Lesson summary:

Benedict's solution is the chemical reagent used to test for the presence of reducing sugars. When boiled with glucose, which is a reducing sugar, an orange precipitate forms.

A change in color from blue to green, yellow, orange and finally red indicates the reducing sugar. The change depends on the amount of reducing sugar present.

The following set up of apparatuses summarizes the process and the result for testing reducing sugar. **Example used is glucose.**



- Provide an opportunity where students can ask questions, where the teacher can help every learner depending on his/her special educational needs
- Helps learners to relate what they have learnt to real life experience
- Allow learners to present their answers and orients their answers

3. Assessment and Conclusion (5 min)

Assessment questions:

Teacher: What reagent do we use to confirm the presence of reducing sugar in a food sample?

Student: The reagent that confirm the presence of reducing sugar in a food sample is Benedict's solution

Teacher: What does indicate the presence of reducing sugar?

Student: During testing of reducing sugar the blue color of Benedict's solution turns green, yellow, orange and finally red depending on the amount of sugar present in the solution

Conclusion:

Teacher: We are coming to the end of our lesson. We have tested food sample containing reducing sugar and providing positive result if are present. Hope everyone has captured the key content of this lesson.

You will do the following homework to enhance your competences:

1. Differentiate reducing sugar and non reducing sugar using Benedict's solution
2. With examples, distinguish between reducing sugars and non-reducing sugars.

Thank you for your participation in this lesson

- Provide opportunities for corrective feedback or positive feedback to students.
- Assess learners basing on the key questions to verify the achievement of learning objectives.
- If possible, take records of their performance and verify the achievement of learning objectives.

LESSON FROM UNIT

6

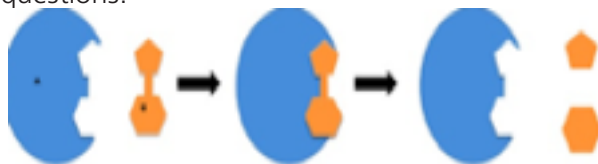
Mode of action of enzymes

Subject: Biology	Grade: S2	Duration : 40 min
LESSON: Enzymes TEACHING AND LEARNING MATERIALS: Animations, textbooks, charts showing enzymes structure, models, etc.		
SECTION/ STEPS	STEP –BY- STEP INSTRUCTIONS AND CONTENT	NOTICE TO THE TEACHER
1. Introduction (10 min)	<p>Teacher: Welcome to Biology lesson. I am sure you are going to enjoy today's lesson. Who can tell us the types of digestion.?</p> <p>Student: Mechanical digestion and chemical digestion.</p> <p>Teacher: What are the substances that are involved in chemical digestion?</p> <p>Student: The enzymes</p> <p>Teacher: What is the function of enzymes?</p> <p>Student: They catalyse chemical reactions including digestion.</p> <p>Teacher: What do you think we are going to learn?</p> <p>Student: We are going to learn Enzymes</p> <p>Teacher: The lesson of today is: Enzymes</p> <p>This lesson will allow you to attain the following objectives:</p> <ul style="list-style-type: none"> – Illustrate enzyme action with reference to the complementary shape of an enzyme and its substrate and the formation of a product. 	<ul style="list-style-type: none"> – Start by gaining the readiness of students and by motivating them. – Connect the learners' expectation related to this lesson to the learning objectives.

- Use the key and lock mechanism to explain how enzymes catalyse reactions.
- Appreciate the importance of specificity of enzymes activity to substrates.

Introductory activity

Teacher: Observe the following pictures and answer the following questions:



Which molecules between A and B represents an enzyme?

Student: The enzyme is represented by molecule A

Teacher: Do all enzymes have the same shape?

Student: No, each enzyme has its own shape.

Teacher: How do enzymes work in reactions?

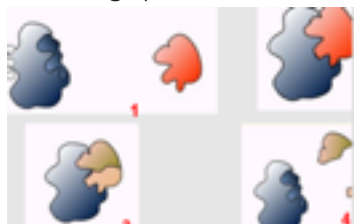
Student: They catalyse chemical reactions.

- Give learners opportunity to reflect on the introductory questions.
- Allow learners to ask question about the topic of the day.
- Build on their questions and communicate the key question:
- Allow learners time to observe carefully the images on both sides.
- Ask learners to note similarities between the situations 1 and 2 .

2. Lesson Development (25 min)

Activity 1

Teacher: Observe carefully the following animation and answer the following question:



How many steps can you identify in this process?

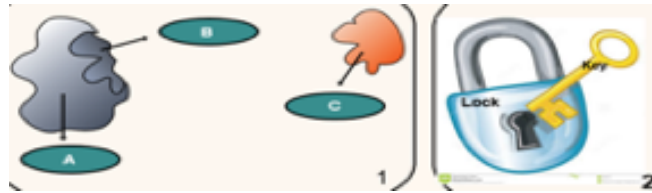
Student: Four steps

Teacher: Identify the names of structures 1 and 2

Student: 1. Is enzyme, 2. substrate

Activity 2

Teacher: Observe the following structure and answer the following questions:



Name parts labelled A, B and C

Student: A is enzyme, B is substrate

Teacher: Which structure can be compared to a lock and which one is like a key? why?

Student: Enzyme and substrate because they are specific from one another.

Activity 3

Teacher: Observe carefully the image and animation below and answer the following question:



- Allow learners the opportunity to share their observations.
- Build on learners' ideas to expand their knowledge.
- At each step, make a pause for students to think and say or write their ideas.
- A break or a song!
- Allow learners time to observe carefully the images
- Ask learners to answer the questions
- Allow learners the opportunity to share their answers

Using the image and animation above, explain the mode of action of enzymes

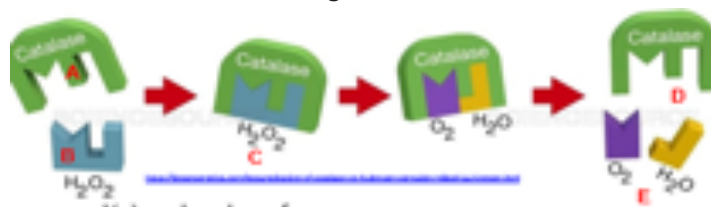
Student: Enzymes are specific, they work closely to PH

Teacher: Explain how enzymes are specific to their substrates.

Student: Like a lock and a key , enzymes are closely working together.

Application activity

Teacher: Observe the images below and answer the following questions:



Which letters represents molecules of:

- A) Enzyme substrate complex
- B) Product
- C) Substrate
- D) An enzyme

Summary/notes

Enzymes are specific in the reactions they catalyze. They have active site whose shape is complementary to the substance they work on (substrate) like a lock and key, thus the lock and key model.

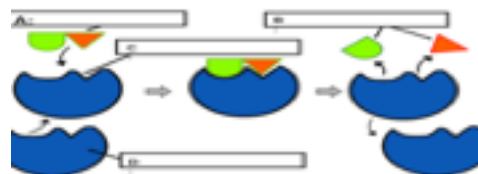
Enzyme and substrate bind to form enzyme - substrate complex which later turns the substrate to products of some characteristics that are close to the enzymes.

- Build on learners' ideas to expand their knowledge
- Help learners to relate what they have learnt to real life experience answering the questions.
- If possible, take records of their performance and verify the achievement of learning objectives.

3. Assessment and Conclusion (5 min)

Assessment questions

1. The molecule with which an enzyme binds is called the:
 - A) Enzyme
 - B) Active site
 - C) Substrate
 - D) Product
2. The following diagram shows an enzyme in action.



Name parts labelled by letters A-D

Students' answers

1. C
2. A is enzyme B is substrate C is enzyme – substrate complex D is

Conclusion

Teacher: We are coming to the end of our lesson. We have mainly studied the characteristics of enzymes whereby Enzymes are specific in the reactions they catalyse.

They have active site whose shape is complementary to the substance they work on (substrate) like a lock and key, thus the lock and key model.

Enzyme and substrate bind to form enzyme - substrate complex which later turns the substrate to products.

- Provide an opportunity where students can ask questions that help to summarize the key points of the lesson.
- Provide opportunities for corrective feedback or positive feedback to students. If possible, take records of their performance after formative assessment and verify the achievement of learning objective

You will do the following homework to enhance your competences:

Homework

1. The part of an enzyme that binds with the substrate molecule is called...
 - B) Product
 - C) Enzyme – substrate complex
 - D) Zymogen
 - E) Active site
2. Explain the key and lock mechanism of an enzyme activity

Thank you for your participation in this lesson and see you next.

- Conclude the lesson by announcing the key subtitles and giving a homework to students.

LESSON FROM UNIT

7

The necessity of light in photosynthesis

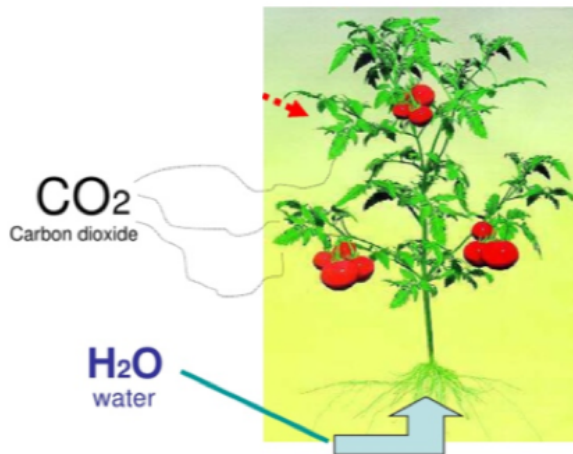
Subject: Biology	Grade: S2	Duration : 40 min
LESSON: Photosynthesis TEACHING AND LEARNING MATERIALS: Charts, manila papers , chalk board, textbook		
SECTION/ STEPS	STEP –BY- STEP INSTRUCTIONS AND CONTENT	NOTICE TO THE TEACHER
1. Introduction (10 min)	<p>Teacher: Welcome to biology lesson, I am sure you are going to enjoy today’s lesson.</p> <p>Who can recall what we have learnt during last lesson?</p> <p>Student: We have studied about the meaning of photosynthesis and the conditions needed for photosynthesis such as chlorophyll, water, light and carbon dioxide.</p> <p>Teacher: What do you think about what will happen to the plant if the sun light is absent?</p> <p>Student: There is no growth because photosynthesis doesn’t occur.</p> <p>Teacher: What do you think we are going to learn?</p> <p>Student: We are going to learn about the necessity of light in photosynthesis.</p> <p>Teacher: Yes of course. The lesson of today is “The necessity of light in photosynthesis”.</p>	<ul style="list-style-type: none">– Begin by gaining students’ attention and readiness.– Give time learners to think on asked questions and allow them to provide their answers/ expectations.

The lesson of today will allow you to attain the following objectives:

- Explain the necessity of sunlight for photosynthesis through worked experiment
- Appreciate the role of light for all living organisms such as plants and animals.

Introductory activity

Teacher: Observe carefully this picture. Discuss and explain in pairs what is lacking for this plant to carry out photosynthesis?



Students: It seems that light is missing; we know that there are the conditions needed for photosynthesis. Light provide energy for the process.

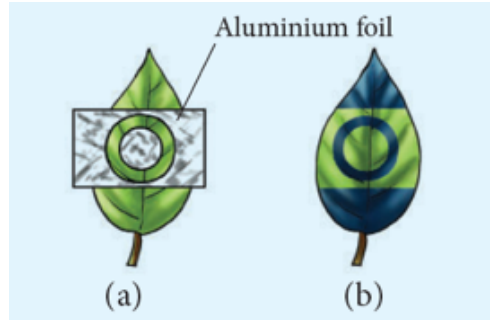
Teacher: You are right. Keep on thinking why light is necessary for photosynthesis. You will answer related questions along this lesson

- Ask learners the lesson of today.
- If learners do not announce the lesson, announce and write it on the chalkboard.
- Give learners opportunity to reflect on the introductory activity and allow the ask questions.
- Build on their questions and communicate the key questions.
- Keep guiding learners' discussions.

2. Lesson Development (25min)

Teacher: This image shows the result from investigating the necessity of light in photosynthesis.

In your groups, observe and analyse it then answer the following questions. You will present your answers.



- What are you observing from the diagram?
- What is the role of this aluminium foil?
- What will happen to this leaf part covered with aluminium foil?
- From this, how can we prove that light is necessary for photosynthesis?

Students' presentation

The aluminium foil prevents the light to reach the leaf.

The part of the leaf that was covered does not receive light and changes the colour.

The uncovered part receives light.

The covered part does not receive light and changes the colour. It tests negatively for starch.

- Provide resources to learners (diagrams)
- Give instructions to learners
- Ask learners to explore and record their findings.
- Ask learners to present their findings
- Build on learners' ideas to expand their knowledge.
- Help learners to relate what they have learnt to real life experience by discussing on asked questions.

	<p>Application activity</p> <p>Teacher: Light is useful in the process of photosynthesis. Can you list other uses of sun light?</p> <p>Student: The light is used in heating water and dry clothes, the sun warms our seas, stirs our atmosphere and generates our weather patterns.</p> <p>Teacher: How could you explain that all animals depend on sun light?</p> <p>Student: All animals depend on the sunlight because, all animals are heterotrophs, they depend on photosynthesis made by plant using sun light as source of energy.</p> <p>Summary</p> <p>In presence of sunlight, photosynthesis takes place producing oxygen as a by-product. Oxygen relights a glowing splint. In darkness no photosynthesis takes place. The set up in the dark cupboard therefore does not produce any oxygen. Light is necessary for photosynthesis to take place. It is a source of energy for plants to do photosynthesis.</p>	<ul style="list-style-type: none"> – Ask some probing questions leading students to summarize the lesson learnt. – Assess learners basing on the key questions to verify the achievement of learning objectives. – Conclude the lesson by announcing the key message and giving a homework to students
<p>3. Assessment & Conclusion (5 min)</p>	<p>Assessment:</p> <p>Teacher: Explain why uncovered part of a leaf test positive for photosynthesis?</p> <p>Student: It test positive because it receives light that is necessary for photosynthesis.</p> <p>Teacher: Describe the role of light in the process of photosynthesis.</p> <p>Student: Sun light energy converts carbon dioxide and water into carbohydrates.</p>	

Conclusion

Teacher: We are coming to the end of our lesson. We have mainly discussed about the necessity of light in photosynthesis and how light is needed for all living organisms.

Hope everyone has captured the key content of this lesson

You will do the following homework to enhance your competence.

1. Describe the role of plants in an ecosystem.

Thank you for your participation in this lesson.

LESSON FROM UNIT

8

Transpiration

Subject: Biology	Grade: S2	DURATION: 80 minutes
LESSON: Transport of water, minerals and organic foods in plants		
TEACHING AND LEARNING MATERIALS: charts, manila papers, chalk board.		
SECTION/ STEPS	STEP –BY- STEP INSTRUCTIONS AND CONTENT	NOTICE TO THE TEACHER
1. Introduction (15 min)	<p>Teacher: Welcome to biology lesson, I am sure you are going to enjoy today 's lesson.</p> <p>Who can recall what we have learnt during last lesson?</p> <p>Student: We studied about the transport of water from roots to different parts of plant, the forces involved so that water is transported from the soil such as root pressure, capillarity, transpiration pull , active uptake of mineral.</p> <p>Teacher: How transpiration pull is needed for absorption of water?</p> <p>Student: Transpiration pull is as a result of water being lost at the leaves. Leaves contain small pores called stomata. Stomata continuously lose water vapour. Since water molecules stick together, a pull is created known as transpiration pull. It allows lost water to be compensated for.</p> <p>Teacher: What do you think we are going to learn?</p> <p>Students: We are going to learn the process transpiration</p>	<ul style="list-style-type: none">– Begin by gaining students' attention and readiness.– Give time learners to think on asked questions and allow them to provide their answers/ expectations– Announce the title of the lesson

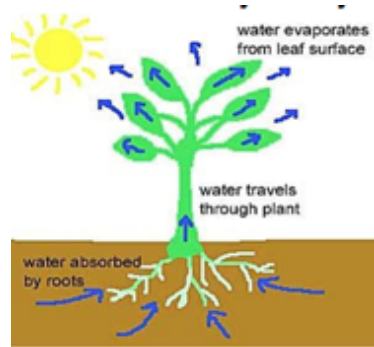
Teacher: Yes, the lesson of today is “Transpiration”

The lesson of today, will allow you to attain the following objectives.

- Explain the process of transpiration
- Describe types of transpiration
- Explain main factors affecting transpiration

Introductory activity

Teacher: Observe the diagram below and answer these questions



Water is the raw material used by plant leaves to produce food during photosynthesis. What will happen to excess water absorbed by plant?

Student: The excess of water must be removed/lost from the plant.

Teacher: Why do plant leaves lose the water in above picture?

Student: Plant loses the water to cool the leaves.

Teacher: Keep thinking on the following questions as we learn and you will answer them along the lesson.

- What is the plant parts used to lose water?
- What are the factors affecting loss of water in plants?

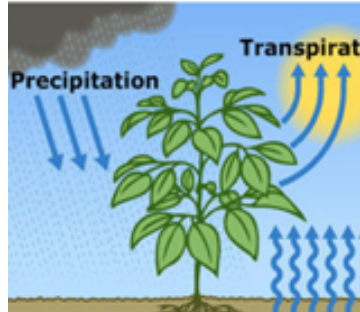
- If learners do not announce them, announce and write them on the chalkboard.
- Connect the learners expectation related to this lesson to the learning objectives
- Allow learners to ask question about the topic of the day.
- Give learners opportunity to reflect on the introductory questions.

2. Lesson Development (55min)

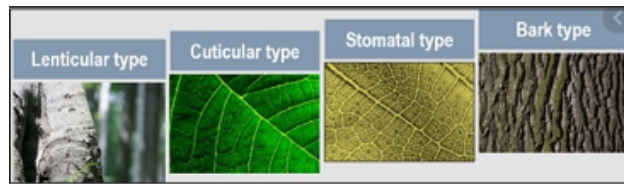
Activity

Teacher: In your groups discuss the following questions

1. Observe carefully the image below and answer the following question



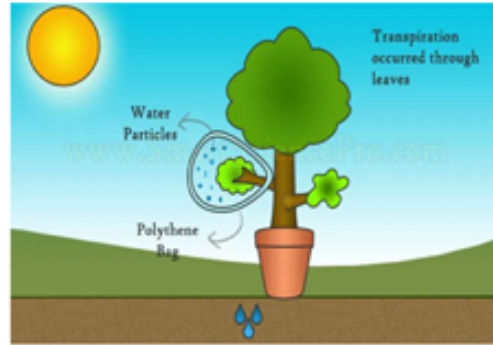
- a) What do you observe on this picture?
 - b) Among these terms, which one describes the loss of water from the plant leaf?
2. The figure below represents different parts of plant where water evaporates from.



- a) Name the parts observed in these pictures?
- b) Are those parts involved in loss of water for plant?
- c) Discuss about the way in which water is lost from the plant according to the picture provided

- Build on their questions and communicate the key questions
- Ask learners to explore and record their findings
- Teacher brings a real leaf to show upper and lower part of the leaf.

3. Study and analyze the figure below



- a) Which is environmental factor that affects transpiration observed on this diagram?
 - b) List other factors that affect transpiration rate.
- 4) How could you know the amount of water lost from a plant?

Students' presentation

1.

- a) On the image , there are the three processes: evaporation, precipitation and transpiration
- b) Transpiration is the loss of water from plant leaves in form of water vapor.

- Students present their findings about the activity
- Build on learners' ideas to expand their knowledge

2.

- a) On the picture there are leaf upper epidermis, leaf lower epidermis, stem bark
- b) Yes, we know that plants lose water through leaves, not only that but also stem part is involved.
- c) There are three ways Stomatal transpiration, Lenticular transpiration and cuticular transpiration
 - 1. **Stomatal transpiration** is the evaporation of water from the stomata of the plant leaves.
 - 2. **Lenticular transpiration** is evaporation of water from the lenticels (minute openings in the bark of stem and fruit)
 - 2. **Cuticular transpiration** is the evaporation of water through a waxy covering on the surface of the leaves of the plants

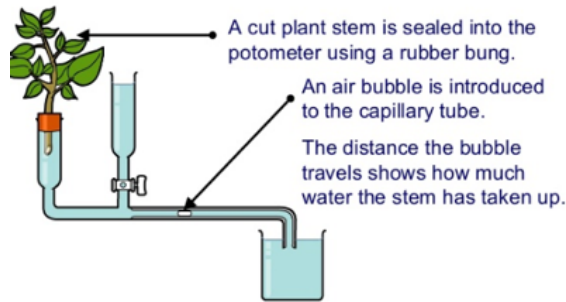
3.

- a) On the diagram there are Light intensity and temperature of environment that affect the transpiration A
- b) The others factors affecting transpiration rate are : Humidity of atmosphere, wind speed, water supply, size and number of stomata, thickness of cuticle

4. The amount of water lost is equal to the amount of water taken by the plant.

The instrument used to measure the transpiration rate is potometer

- Help learners to relate what they have learnt to new situation by discussing the given case study
- Provide opportunities for students to ask questions.



Application activity:

Teacher: In summer period, farmers watering their developing plants in order to encourage plant growth. Why is it necessary to watering the plants in summer period?

Student: It is better to supply water to the plants in order to replace the amount of water that is lost to regulate temperature.

Teacher: What will happen to the amount of water absorbed by plants in this condition?

Student: Absorbed water is used for photosynthesis and cooling (transpiration).

Teacher: Think and Explain why the stomata are located in lower epidermis of the leaf not on upper epidermis?

Student: They are located in lower side of leaf in order to hide and reduce the rate of transpiration in plant.

Summary

Transpiration is the evaporation of water from the plant surface mainly through the leaf.

- Provide an opportunity where students can ask questions, where the teacher can help every learner depending on his/her special educational needs, and ask some questions leading students to summarize the lesson learnt

	<p>Leaves contain small pores called stomata on their surfaces, which open and close.</p> <p>This allows the exchange of respiratory gases as well as the loss of water in form of vapour. This is known as stomatal transpiration.</p> <p>There are other ways through which plants can lose water. They include: lenticular transpiration and cuticular transpiration.</p> <p>Environmental factors that affect the rate of transpiration include: temperature, humidity, wind and light intensity.</p> <p>Transpiration is important for plant: Plant becomes cool all the time, Large amount of water gets into the plant, Distribution of water is throughout the plant. Some substances are transported to upper regions of the plant</p>	<ul style="list-style-type: none"> – Assess learners basing on the key questions to verify the achievement of learning objectives
<p>3. Assessment, & Conclusion (10 min)</p>	<p>Assessment</p> <p>Teacher: Describe the meaning of transpiration</p> <p>Student: Transpiration is the evaporation of water from the plant surface mainly through the leaf. Much of the water that plants take up through their roots is lost to the atmosphere by evaporation</p> <p>Teacher: Provide any two significance/ importance of transpiration for a plant</p> <p>Student: It cools the plant on hot days. It also assists the movement of water and mineral salts up the plant. Plants are able to maintain a steady supply of water since the lost water has to be compensated for.</p> <p>Teacher: Provide the difference between three types of transpiration</p> <p>Student: Stomatal transpiration, the loss (evaporation) of water through leaves.</p> <p>Cuticular transpiration the loss of water through the cuticle in herbaceous stems.</p>	

Lenticular transpiration This is the loss of water through the lenticels found in woody stems.

Conclusion

Teacher: We are coming to the end of our lesson. We have mainly explained the transpiration process, three types of transpiration, environmental factors affecting the transpiration and how to measure the transpiration rate.

Hope everyone has captured the key content of this lesson.

You will do the following homework to enhance your competence

1. Explain why plants growing in an enclosed environment (greenhouse) have a lower rate of transpiration than plants growing in the open field?
2. Explain the following observation. A freshly cut stump of a tree will continue releasing water for some time.

Thanks for your participation in this lesson, see you next.

- Conclude the lesson by announcing the key subtitles and giving a homework to students

LESSON FROM UNIT

9

Mechanism of breathing in human

Subject: Biology

Grade: S2

DURATION: 80 minutes

LESSON: Gaseous exchange in human and plants

TEACHING AND LEARNING MATERIALS: Charts, chalk board, improvised material, text book

SECTION/ STEPS	STEP –BY- STEP INSTRUCTIONS AND CONTENT	NOTICE TO THE TEACHER
1. Introduction (15 min)	<p>Teacher: Welcome to biology lesson, I am sure you are going to enjoy today's lesson.</p> <p>Who can recall us what we have learnt during last lesson?</p> <p>Student: We have learnt about the specialized structure for gaseous exchange in animals and their characteristics for efficient gaseous exchange.</p> <p>Teacher: How do animals such as human get air for gaseous exchange?</p> <p>Student: Human gets air for gaseous exchange by breathing process.</p> <p>Teacher: What do you think we are going to learn?</p> <p>Student: We are going to learn the breathing mechanism in human.</p> <p>Teacher: Yes, the lesson of today is "Mechanisms of breathing in human"</p>	<ul style="list-style-type: none">– Begin by gaining students' attention and readiness.– Give time learners to think on asked questions and allow them to provide their answers/ expectations– Announce the title of the lesson

The lesson of today, will allow you to attain the following objectives:

- Demonstrate the process of inhalation and Exhalation.
- Construct a bell-jar model apparatus from locally available materials.
- Explain the mechanism of breathing in humans
- Appreciate the importance of breathing mechanism in human

Introductory Activity

Teacher: Work in pairs, carry out the following exercise:

1. Ask your partner to breathe in deeply then hold their breath.
2. Describe what you see happening to the chest as your partner breathes in. Does it remain in the same position?
3. Let your partner now breathe out. What do you see happening to the chest?
4. Record the form of movements noticed.

Student:

For the breathing in, the chest moves up.
For breathing out, the chest moves down.

Key question

How does breathing occur in humans?

– The lesson of today, will allow you to attain the following objectives:

- Demonstrate the process of inhalation and Exhalation.
- Construct a bell-jar model apparatus from locally available materials.
- Explain the mechanism of breathing in humans
- Appreciate the importance of breathing mechanism in human

2. Lesson Development

(55 min)

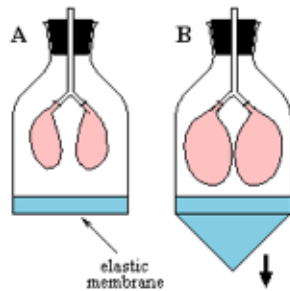
Activity 1

Teacher: Take the respiration model. Pull down the elastic rubber and observe what is happening.

Release that membrane and notes the observation.



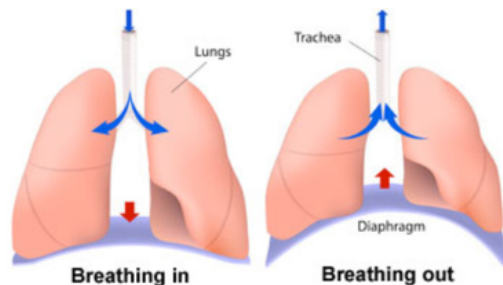
Student: While pulling down, the volume of balloon increases and while releasing the rubber, the volume of balloon decreases as shown below.



Activity 2

Teacher: Observe the following diagram. What are the main features when there is breathing in and breathing out on this diagram?

- Give learners opportunity to reflect on the introductory questions.
- Build on their questions and communicate the key questions



Student:

Breathing in: - diaphragm moves down - volume of lungs increases

Breathing out: - diaphragm curves upward - lungs' volume decreases

Application activity

Teacher: How does exercise affect the breathing rate?

Student: Exercise need much oxygen, then breathing rate increases so that more oxygen is taken during breathing in and much carbon dioxide expelled out during breathing out.

Teacher: Explain the benefits of deep breathing.

Student: Deep breathing encourages more oxygen exchange; this is beneficial trade of incoming oxygen for outgoing carbon dioxide.

Summary

Breathing involves two phases called inhalation and exhalation. Inhalation is also known as inspiration. This is the active phase of breathing which draws air into the lungs. During inhalation, the diaphragm muscles contract causing it to flatten. In the ribs region, the external intercostal muscles contract while the internal intercostal muscles relax. This causes the rib cage to move upwards and outwards.

- Provide time to learners to explore and manipulate the improvised material provided
- Guiding the learners in the activity
- Provide time to Present their findings
- Build a consensus after presentation of the activity

	<p>The contraction of the diaphragm and external intercostal muscles increases the volume in the chest cavity. However, it causes a decrease in the pressure of air inside compared to atmospheric air. Air rushes through the air passages into the lungs, forcing them to expand.</p> <p>Exhalation is also known as expiration. This is the phase of breathing, which expels air out of the lungs. During exhalation, the diaphragm muscle relaxes making it to move upward and regain its dome shape. The external intercostal muscles relax and the internal intercostal muscles contract. This causes the rib cage to move downward and inwards. The volume of the chest cavity decreases and the pressure increases compared to the atmospheric air. Increased pressure forces air out of the lungs, which become deflated.</p>	<ul style="list-style-type: none"> – Help learners to use what they have learnt new situation by discussing the given case study – Provide an opportunity where students can ask questions, where the teacher can help every learner depending on his/her special educational needs, and ask some questions leading students to summarize the lesson learnt
<p>3. Assessment and Conclusion (10 min)</p>	<p>Assessment</p> <p>Teacher: Define the following terms: Inhalation and Exhalation</p> <p>Student: Inhalation is a process where by air get entered into the lungs Exhalation is a process where air is expelled out from lungs</p> <p>Teacher: Describe the process of inhalation and Exhalation in human</p> <p>Student: During inhalation, the rib cage expands as the rib muscles contract, Diaphragm move down (contracts) then air is move in. During exhalation, the rib cage gets smaller as the rib muscles relax, diaphragm relaxes (moves up)</p> <p>Teacher: Breathing involves two phases</p> <ol style="list-style-type: none"> A. Inspiration and expiration B. Inspiration and inhalation C. Inspiration and respiration D. Inspiration and excretion 	

Student: A

Teacher: Explain how the contraction of the diaphragm and external intercostal muscles causes air to enter into the lungs.

Student: The contraction of the diaphragm and external intercostal muscles increases the volume in the chest cavity. However, it causes a decrease in the pressure of air inside compared to atmospheric air. Air rushes through the air passages into the lungs, forcing them to expand.

Teacher: We are coming to the end of our lesson. We have mainly explained the two phases involved in breathing mechanism and its importance. Hope everyone has captured the key content of this lesson. You will do the following homework to enhance your competence.

1. Briefly explain a series of events that take place during breathing.

Thank you for your participation in this lesson

- Provide opportunity for corrective feedback to students
- If possible , take records of their performance and verify the achievement of learning objectives
- Conclude the lesson by announcing the key subtitles and giving a homework to students

LESSON FROM UNIT

10

Urine formation

Subject: Biology

Grade: S2

DURATION: 80 minutes

LESSON: Excretion

TEACHING AND LEARNING MATERIALS: Charts, manila paper, chalkboard, textbook.

SECTION/ STEPS	STEP –BY- STEP INSTRUCTIONS AND CONTENT	NOTICE TO THE TEACHER
1. Introduction (15 min)	<p>Teacher: Welcome to biology lesson, I am sure you are going to enjoy today's lesson.</p> <p>Who can help us to recall what we have learnt during last lesson?</p> <p>Student: We have studied the different parts of human urinary system such kidney, ureter, urethra, urinary bladder and the structure of kidney.</p> <p>Teacher: What is the function of urinary system?</p> <p>Student: It involves infiltration of blood, and remove the waste material from the body.</p> <p>Teacher: In which form those waste materials are removed from the body?</p> <p>Student: They are removed from the body in form of urine.</p> <p>Teacher: Do you know how that urine is formed?</p> <p>Student: No, but it is in form of waste materials and liquid form.</p>	<ul style="list-style-type: none">– Begin by gaining students' attention and readiness.– Give time learners to think on asked questions and allow them to provide their answers/ expectations– Announce the title of the lesson

Teacher: What do you think we are going to learn.

Student: We are going to learn the process of urine formation.

Teacher: Yes, the lesson of today is “Urine formation”.

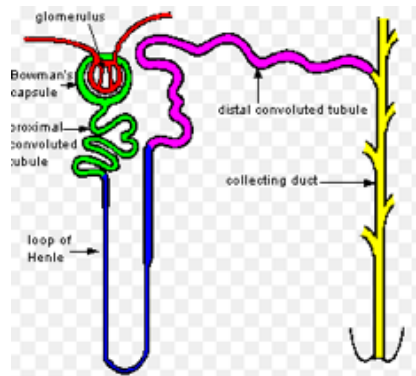
The lesson of today, will allow you to attain the following objectives.

- Describe the steps involved in the process of urine formation.
- Demonstrate that an individual may eliminate much dilute urine or little but concentrated urine.

Introductory activity

Teacher: Individually, draw and label a simple diagram representing a structure of nephron as we have seen it in our last lesson. What is the function of a nephron?

Student:



A nephron is the basic structural and functional unit of the kidneys that regulates water and soluble substances in the blood by filtering the blood, reabsorbing what is needed, and excreting the rest as urine.

- If learners do not announce them, announce and write them on the chalkboard.
- Connect the learners expectation related to this lesson to the learning objectives
- Allow learners to ask questions about the topic of the day
- Give learners opportunity to reflect on the introductory questions.

Key question

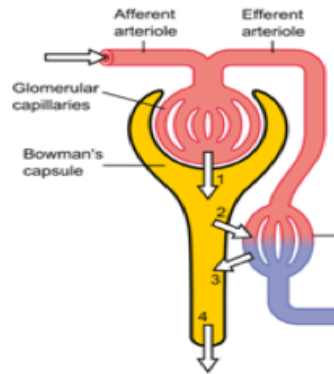
1. By which process urine is formed?
2. How the urine is eliminated from the body?

2. Lesson Development (55 min)

Activity:

Teacher: Form groups and discuss about the following questions. You may use your books or search on internet.

1. Observe carefully the diagram representing the real structure of nephron and answer to the questions:
 - a. What does happen to the blood that enters the glomerulus of the nephron?
 - b. Do you think the amount of blood in afferent arteriole is the same as in efferent arteriole? Why?



2. One day you take more water and eating less salty food, on the next day you take in less water and eat more salty food. At which time have you urinating more? What about the quantity of urine when is too hot or when is cold?

- Guiding the discussion
- Ask learners to explore and record their findings
- Ask learners to present their findings
- Build on learners' ideas to expand their knowledge

Students' presentation

1.
 - a) There is filtration of blood, the filtrate in Bowman's capsule reaches the renal tubule (Known as Ultrafiltration) where some substances are taken again in blood (this is called reabsorption). There are also some substances (toxic substance such as urea, creatinine, excess of salt) from the blood that are added into filtrate in renal tubule (called secretion).
 - b) No, in efferent arteriole there is small amount because some amount escape the glomerulus by ultrafiltration.
2. The day you take more water and salty food, you will urinate more. When is cold, the body need to filter more blood than normal as the blood is rushing to your vital organ at a higher frequency, this result in having to pee more often. When is hot, we lose water in form of sweat, direct evaporation. So kidney retain water for maintaining the blood volume and less urine is formed.

Application activity

Teacher: Answer the following questions:

Question: Two filtrates were obtained from different parts of the nephron. Filtrate A contained glucose, amino acids, water and urea while filtrate B contained water and urea.

- i) From which part of the nephron was filtrate A and B extracted? Give reasons for your answer.
- ii) Justify the absence of proteins and blood cells in either of the filtrate.

- Help learners to relate what they have learnt to real life experience by discussing the given case study

Student:

- i) A filtrate is in part called proximal tube while B filtrate is in part called collecting duct.

Because in proximal tubule there is reabsorption of glucose, amino acid, ions, thus all glucose, a a are taken into the blood, while urea is secreted in from the blood into filtrate in renal tubule.

- ii) Proteins and blood cells are large enough to pass across glomerulus.

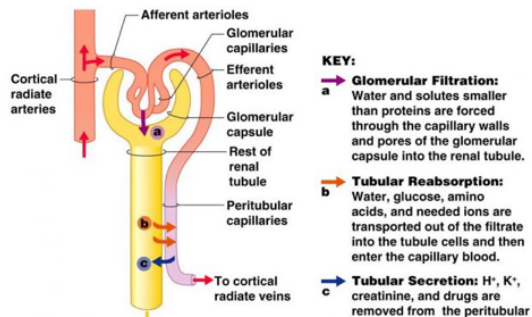
Teacher: To avoid losing too much water, a desert kangaroo excretes very concentrated urine. Explain how its nephron is adapted to enable this

Student: The nephron has long loop of Henle to reabsorb more water.

Summary:

The process of urine formation involves three main stages: ultrafiltration, Selective reabsorption and Tubular secretion.

The following diagram shows the pathway and parts in the urine formation process:



- Provide an opportunity where students can ask questions, where the teacher can help every learner depending on his/ her special educational needs, and ask some questions leading students to summarize the lesson learnt

Urine is transported through the ureters to the bladder where it is stored temporarily before it is removed from the body through the urethra.

The volume and concentration of urine is affected by water intake, salt intake, temperature, exercise etc.

- Provide opportunity for corrective feedback to students
- If possible, take records of their performance and verify the achievement of learning objectives
- Conclude the lesson by announcing the key subtitles and giving a homework to students

3. Assessment and Conclusion (10 min)

Assessment

Teacher: State any four factors that affect the formation of urine.

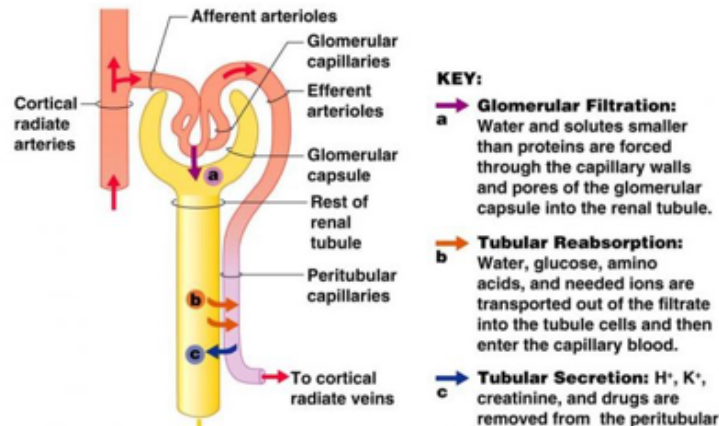
Student: Any four Factors that affect urine production are amount of fluids taken, Amount of salt taken, Weather Physical activity.

Teacher: Explain why the concentration of urea in the urine increases by the time the filtrate reaches the collecting duct.

Student: Because there is secretion of urea in filtrate in renal tubule .

Teacher: With a help of a diagram, explain the process of urine formation.

Student:



Teacher: We are coming to the end of our lesson. We have mainly studied the three stages involved in urine formation and different factor affecting the urine formation.

Hope everyone has captured the key content of this lesson

You will do the following homework to enhance your competency

1. What is the effect of physical exercises on the concentration of the urine produced?

Thank you for your participation, see you next.

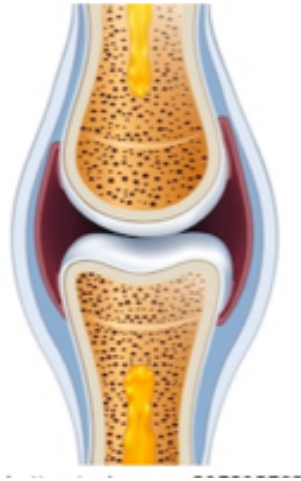
- Conclude the lesson by announcing the key subtitles and giving a homework to students

Structure of Synovial Joints

Subject: Biology		Grade: S2	
LESSON: Structure of Synovial Joints			
SECTION/ STEPS	STEP –BY- STEP INSTRUCTIONS AND CONTENT		NOTICE TO THE TEACHER
1. Introduction (10 minutes)	<p>Teacher: Welcome to Biology lesson. I am sure you are going to enjoy today's lesson.</p> <p>Who can tell us the meaning of a synovial joint?</p> <p>Students: Synovial joint is the type of joint found between bones that move against each other.</p> <p>Teacher: What do you think we are going to learn?</p> <p>Students: We are going to learn the structure of synovial joints.</p> <p>Teacher: Yes, we start a new lesson. The lesson of today is Structure of a synovial joint. This lesson will allow you to attain the following objectives: Differentiate ball and socket, hinge, ellipsoid, pivot, gliding and saddle joint. Locate the ball and socket, pivot, hinge, gliding and saddle joint on human body.</p> <p>Analyze the structure of synovial joints</p> <p>Draw and label a typical synovial joint</p>		<ul style="list-style-type: none"> – Begin by gaining students' attention and readiness. – Ask general questions on the new lesson know the students' prerequisites. – Give time learners to think on asked questions and allow them to provide their answers/ expectations.

Introductory activity:

Teacher: Observe the following chart. What do you see on the diagram?



Students: on the diagram we see a synovial joint.

Teacher: What is the role of a synovial joint?

Students: Synovial joint achieves movement at the point of contact of the articulating bones.

Teacher: What will happen to a person without synovial joint?

Students: Without synovial joint, we cannot move easily.

– Connect the learners' expectations related to this lesson to the key unit competence and lesson objectives.

– Ask learners the unit or lesson title.

– If learners do not announce them, announce and write them on the chalkboard.

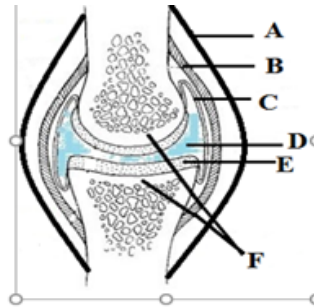
– Communicate the lesson objectives.

2. Lesson Development (25 minutes)

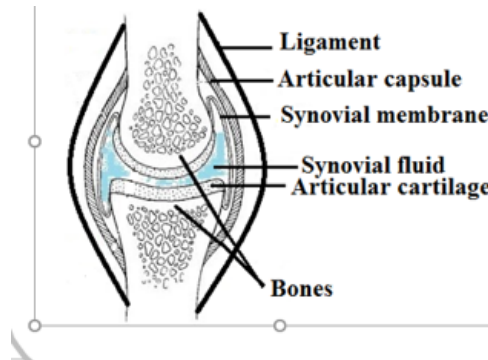
Learning activity1:

Teacher: Observe the following diagram and answer the following questions

1. Observe the diagram and name the parts A, B, C, D, E and F.



Students' presentation: A is ligament, B is articular capsule, C is Synovial membrane, D is articular cartilage, E & F are bones.



- Motivate them and raise their interest in following carefully the lesson such that they can answer the key questions.

Learning activity 2:

Teacher: In your groups discuss the following questions and after you present your findings.

1. Locate the ball and socket, pivot, hinge, gliding and saddle joint on human body
2. Which joint moves like a door?
 - A. slightly moveable joints
 - B. hinge joints
 - C. ball-and-socket joints
 - D. fixed joints
3. Differentiate ball and socket, hinge, ellipsoid, pivot, gliding and saddle joint.

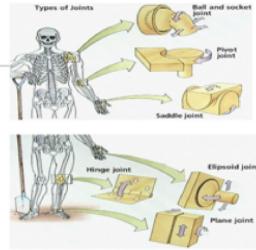
Students' presentation.

1. Ball and socket joint are found in the hip and shoulder. Hinge joint is found in fingers, toes, knees, elbows, and ankles. Pivot joint is found in your neck and wrist. Gliding joint is found in the wrists and ankles and spine.
2. B

- Always emphasize new concepts.
- Build on learners' ideas to expand their knowledge.
- After each activity, remember to put an energizer/warm up to capture learners' attention.
- Guide them until the whole diagram is well explained.
- Use different questions to probe students to understand the content.

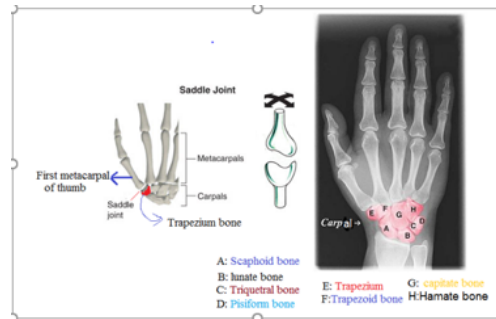
3.

- **Joints**
- **Ball & Socket**
- **Pivot**
- **Saddle**
- **Hinge**
- **Elipsoid (Condylod)**
- **Plane or Gliding - vertebrae**



Learning activity 3:

Teacher: Observe carefully the bellow diagrams and state the function of saddle joint in thumb



Students' presentation:

.Saddle joints are so named because the ends of each bone resemble a saddle with concave and convex portions that fit together.

Saddle joints allow movement back and forth and up and down (not rotation)

Saddle joint providing more flexibility than a hinge or gliding joint In thumbs, saddle joint allows it to tightly touch each of your other fingers With the help of this joint, the most important human trait of gripping objects and making tools was possible

- Write on chalkboard the learners' answers
- Keep guiding learners in every step.
- Build a consensus after every activity and presentation.

Application activity:

Teacher: suppose someone falling down and getting joint sprain of knee joint during marathon.

- a) What will be supposed to happen to the joint structure?
- b) Why is it better to apply ice around the damaged area
 - Allow the learners to present their answers
 - Teacher orients the learners 'answers

Students:

a) The following are supposed to happen to the joint structure when someone get joint sprain:

Ligaments are broken down completely or separate from the bone.

Tendons, cartilage, and blood vessels might also be damaged due to the sprain.

The fluid leaks out of a vein, artery, lymph vessel, or synovial membrane into the surrounding tissue causing the tissue to expand or swell

b) Ice reduces blood flow to the damaged ligament.

Ice constricts or narrows blood vessels

Ice is effective to reduce swelling and alleviate pain.

- Allow learners to present their answers
- Teacher orients the learner's answers
- NB: The application activity helps learners to relate what they have learnt to real life experience

SUMMARY

Synovial joint that has synovial fluid between the bones covered by synovial membrane that secrete them.

Cartilage at the end of each bones in synovial membranes acts as shock absorber. Ball and socket joint that allow allows wide range of movement in almost any direction.

Hinge joint operate just like the hinges on a door. Pivot joint also is known as rotary joint it allows rotational movement.

Saddle joint makes our thumbs opposable, a trait that allows us to firmly grasp objects with our hands.

Gliding joint allows sliding motion

- Provide an opportunity where students can ask questions, where the teacher can help every learner depending on his/ her special educational needs, and ask some questions leading students to summarize the lesson learnt.

3. Assessment and conclusion

ASSESSMENT QUESTIONS:

Teacher: which joint moves like a door?

- A. slightly moveable joints
- B. hinge joints
- C. ball-and-socket joints
- D. fixed joints

Student: B

Teacher: Joints that allow human bones to move in all directions are called

- A. fixed joints
- B. slightly moveable joints
- C. hinge joints
- D. ball-and-socket joints

Students: D

- Provide opportunities for students to ask questions

- Provide opportunities for corrective feedback or positive feedback to students.

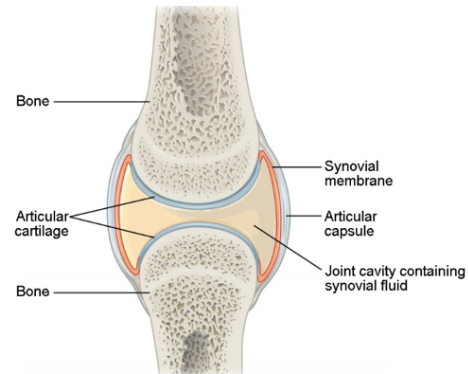
Teacher: In a synovial joint, the bones are connected to each other

- A)** True
- B)** False

Students: B

Teacher: Drawing a picture that illustrate the structure of a typical synovial joint.

Students:



- If possible, take records of their performance after formative assessment and verify the achievement of learning objectives.

5
Conclusion
(5 minutes)

Teacher: We are coming to the end of our lesson. We have mainly studied the meaning of a synovial joint, the role of a synovial joint, to differentiate different types of joints, location of each joint and analyze the structure of a synovial joint. Hope everyone has captured the objectives of this lesson.

You will do the following home work to enhance to enhance your competences.

Draw the structure of a synovial point and put the allows indicating all of its parts.

Thank you for your participation, see you next.

- Conclude the lesson by announcing the key subtitles and giving a homework to students.

LESSON FROM UNIT

12

Transmission of infectious diseases

Subject: Biology Grade: S2

LESSON: Transmission of infectious diseases

TEACHING AND LEARNING MATERIALS: Drawings, manila papers, chalk and chalkboard, pens, books, etc.

SECTION/ STEPS	STEP -BY- STEP INSTRUCTIONS AND CONTENT	NOTICE TO THE TEACHER
1. Introduction (10 minutes)	<p>Teacher: Welcome to Biology lesson. I am sure you are going to enjoy today's lesson. Who can tell us an example of infectious disease?</p> <p>Students: an example of infectious diseases is Corona virus.</p> <p>Teacher: What is the other name of infectious diseases?</p> <p>Students: infectious disease is a disease which can spread from one person to another.</p> <p>Teacher: What do you think we are going to learn?</p> <p>Students: We are going to learn transmission of infectious diseases.</p> <p>Teacher: Yes, we are going to start a new lesson, the lesson of today is transmission of infectious diseases.</p>	<ul style="list-style-type: none">– Begin by gaining students' attention and readiness.– Ask general questions on the new lesson know the students' prerequisites.– Give time learners to think on asked questions and allow them to provide their answers/ expectations.

This lesson will help you to attain the following objectives:

- To explain pathogen, epidemic, pandemic, host, infectious diseases, and vector.
- To know how the body defend itself against diseases.
- To identify the vectors and causal agents of some infectious diseases.
- To identify the ways of transmission of infectious diseases.

Introductory activity

Teacher: Observe the following picture and answer to the following question:



What do you think the people on the diagram is suffering from?

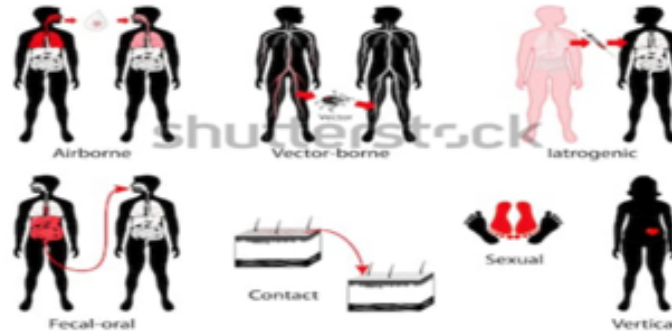
Students: Covid19.

Teacher: What causes covid19?

Students: Covid19 is caused by corona virus.

- Give time learners to think on asked questions and allow them to provide their answers/ expectations.
- Connect the learners' expectations related to this lesson to the key unit competence and lesson objectives.
- Ask learners the lesson title.
- If learners do not announce it, announce and write it on the chalkboard.

Teacher: Observe the following figure and answer to the question.



1. What do you think the people on the diagram are suffering from?
2. How are the diseases on the chart/drawing transmitted?

Students:

1. The people on the diagram are suffering from infectious diseases.
2. The main ways of transmission of infectious diseases are:
 - Transmission through the air
 - Transmission through the contaminated water and food
 - Transmission through blood transfusion or contact with contaminated blood.
 - Transmission through physical contact with infected person.
 - Transmission by vectors.

- Communicate the lesson objectives.
- Allow learners to ask questions about the topic of the day.
- Motivate them and raise their interest in following carefully the lesson such that they can answer the key questions.
- Ask a learner to present their findings/answers.
- Note on the chalkboard what the learner present.
- Ask other learners to complement the previous presenter until the list is complete.
- Always emphasize new concepts.

2. Lesson Development (25 minutes)

Students: Malaria, Cholera, HIV and AIDS, Tuberculosis, Covid19 and Ebola.

Teacher: Enumerate the vectors of the following diseases Malaria, Sleeping sickness, Ebola.

Students: Malaria is transmitted by Female anopheles' mosquito.

Trypanosomiasis (sleeping sickness) is transmitted by Tsetse fly.

Ebola is transmitted by bat and other wild animals.

Learning activity 2.

Teacher: Explain the following terms: Pathogen, host, infectious diseases, epidemic and pandemic.

Students: Pathogen is any disease-causing microorganism.

Host is an organism which harbors a disease-causing organism.

Infectious disease is a disease capable of spreading from one person to another.

Epidemic is a widespread disease that affects many individuals in a population.

Pandemic is a disease that hits a wide geographical area and affects a large proportion of the population.

- Build on learners' ideas to expand their knowledge.
- After each activity, remember to put an energizer/warm up to capture learners' attention.
- Use different questions to probe students to understand the content.
- Write on chalkboard the learners' answers
- Keep guiding learners in every step.
- Build a consensus after every activity and presentation.

Application activity:

Teacher: In one village, there was weeding ceremonies. People attending have gotten meals and drink together and others sleep in the same bed because of the shortage of the beds. The people come from different places. After one week, most of them were sick and show the same signs and symptoms you are a doctor and you receive the patients, what do you think is the cause of the problem?

Student: The cause is the food they consumed.

The food contaminates pathogens and transmits diseases to the consumers. This is the food-borne disease.

Summary:

Infectious diseases are also known as communicable diseases. They are diseases that are transmitted from one person to another.

Infectious diseases are also known as communicable diseases. They are diseases that are transmitted from one person to another. Modes of transmission of infectious diseases include: Contaminated food and water, contaminated air, unprotected sexual intercourse with infected person, by direct contact.

- Allow learners to present their answers
- Teacher orients the learner's answers
- **NB:** The application activity helps learners to relate what they have learnt to real life experience
- Provide an opportunity where students can ask questions, where the teacher can help every learner depending on his/her special educational needs, and ask some questions leading students to summarize the lesson learnt.

3. Assessment and conclusion (5 minutes)

ASSESSMENT QUESTIONS

Teacher: What causes Malaria?

Students: Malaria is caused by plasmodium (protozoa).

Teacher: What causes Covid19?

Students: Covid19 is caused by corona virus.

Teacher: Name any three ways in which infectious diseases are transmitted.

Students: Infectious diseases are transmitted through contaminated water and food, by vectors, through un protected sexual intercourse, Physical contact with infected person etc.

We are coming to the end of our lesson. We have mainly studied the meaning of infectious diseases, the causal agents of infectious diseases, the vectors of infectious diseases, and the main ways of transmission of infectious diseases. Hope everyone has captured the key content of this lesson.

You will do the following home work to enhance your competences:
What are the ways of prevention of communicable diseases?

Thank you for your participation in this lesson, see you.

- Provide opportunities for corrective feedback or positive feedback to students.
- If possible, take records of their performance after formative assessment and verify the achievement of learning objectives.
- Conclude the lesson by announcing the key subtitles and giving a homework to students

Immunity and Vaccination

Subject: Biology Grade: S2

LESSON: Immunity and Vaccination

TEACHING AND LEARNING MATERIALS: Drawings, manila papers, chalk and chalkboard, pens, books, etc.

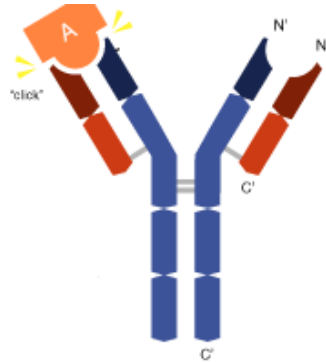
SECTION/ STEPS	STEP –BY- STEP INSTRUCTIONS AND CONTENT	NOTICE TO THE TEACHER
1. Introduction (10 minutes)	<p>Teacher: Welcome to Biology lesson. I am sure you are going to enjoy today's lesson. Who can tell us the importance of vaccination?</p> <p>Students: Vaccination increases the immune response of our body.</p> <p>Teacher: What part of the human body that helps us to fight against diseases?</p> <p>Students: The white blood cells help in fighting against diseases.</p> <p>Teacher: What do you think we are going to learn?</p> <p>Students: Immunity and vaccination.</p> <p>Teacher: We start the new unit called Immunity and vaccination, the key unit competence of this unity is to be able to describe natural and artificial methods that fight infections. The lesson of today is antibody and antigens.</p>	<ul style="list-style-type: none"> – Begin by gaining students' attention and readiness. – Ask general questions on the new unit to know the students' prerequisites. – Give time learners to think on asked questions and allow them to provide their answers/ expectations.

This lesson will help you to attain the following objectives:

- Explain how each pathogen has its own antigen.
- Define active immunity, pathogen and antibody production in the boy.
- Describe the antibody-antigen complex.
- Identify different parts of an antibody.

Introductory Activity

Teacher: observe the following chart. What do you see on that diagram?



Students: on the diagram we see an antibody.

Teacher: Do you think an antibody consists of which system in the human body?

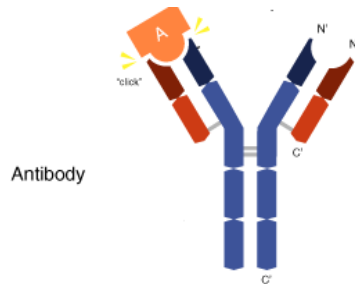
Students: Immune response.

- Connect the learners' expectations related to this lesson to the key unit competence and lesson objectives.
- Ask learners the unit or lesson title.
- If learners do not announce them, announce and write them on the chalkboard.
- Communicate the key unit competence and lesson objectives.
- Allow learners to ask questions about the topic of the day.

2. Lesson Development (25 minutes)

Learning activity 1

Teacher: Observe the following diagram and answer the following questions in your groups.



- What are the main parts of antibody?
- What is the role of antibody?

Students' presentation:

- Antibody has the following parts:
 - Antigen- bonding site.
 - Light chain.
 - Disulfide bonds.
 - Heavy chain.
- The role of antibody is to identify and neutralize pathogens.
- Antibody has the following parts:
- The role of antibody is to identify and neutralize pathogens

- Motivate them and raise their interest in following carefully the lesson such that they can answer the key questions
- Ask a learner to present their findings/answers.
- Note on the chalkboard what the learner present.
- Ask other learners to complement the previous presenter until the list is complete.
- Always emphasize new concepts.
- Build on learners' ideas to expand their knowledge.
- After each activity, remember to put an energizer/warm up to capture learners' attention

Learning activity 2

Teacher: In your groups, discuss the following questions then after present your findings:

In the body there are white blood cells, when microorganisms find their way into the body, they can cause diseases or cannot cause diseases.

- what will happen inside the body?
- why some organisms will be affected by the presence of a foreign organisms while others not?

Students' presentation:

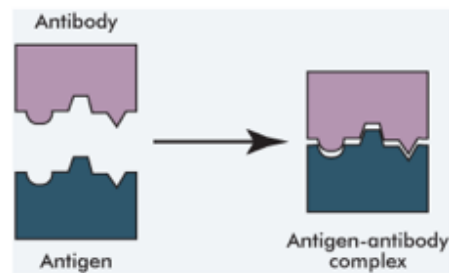
- There is a mechanism of defending the body by antibodies.
- Because some organisms can fight against the foreign organism while they cannot able to do so.

Learning activity 3:

Explain key and lock complex and relate it to the antigen-antibody complex.

Teacher: Draw the diagram of antigen-antibody complex.

Students:



- Use different questions to probe students to understand the content.
- Write on chalkboard the learners' answers
- Keep guiding learners in every step.
- Build a consensus after every activity and presentation.
- Allow learners to present their answers
- Teacher orients the learner's answers
-

	<p>Application activity:</p> <p>Teacher: What is the role of vaccine?</p> <p>Students: Vaccine helps to increase the immunity of our body.</p> <p>Teacher: Differentiate natural immunity from artificial immunity.</p> <p>Students: Natural immunity occurs when you become immune to a specific disease after contracting it while Artificial immunity is what we get from vaccines.</p> <p>Summary</p> <p>An antibody is a protein produced by the body's immune system when it detects harmful substances, called antigens. Examples (bacteria, fungi, parasites, and viruses) and chemicals.</p> <p>An antigen is any substance that triggers the immune system to produce antibodies that fight and destroy the antigen.</p> <p>antibody are Y-shaped proteins that are produced by immune system.</p> <p>Functions of antibodies are: Neutralization, activate the complementary system to destroy bacterial cells by lysis and opsonization.</p>	<ul style="list-style-type: none"> - NB: The application activity helps learners to relate what they have learnt to real life experience - Provide an opportunity where students can ask questions, where the teacher can help every learner depending on his/her special educational needs, and ask some questions leading students to summarize the lesson learnt.
<p>3. Assessment and Conclusion (5 minutes)</p>	<p>Teacher: What is antigen?</p> <p>Students: Antigen is a substance capable of stimulating an immune response, especially activating the body to produce antibodies.</p> <p>Teacher: What are the steps of formation of antigen-antibody complex?</p>	

Students: The steps of the formation of antigen-antibody complex are:

- Neutralisation
- Agglutination
- Precipitation and
- Plasma complement system.

We are coming to the end of our lesson. We have mainly studied the meaning of antibody and antigen, the formation of antigen- antibody complex, the role of antibody, and why each pathogen has its own antigen as well as the specificity of an antigen. Hope everyone has captured the key content of this lesson.

You will do the following homework to enhance your competences:

By using a table, give the difference between Natural immunity and Artificial immunity.

Thank you for your participation in this lesson, see you.

- - Provide opportunities for corrective feedback or positive feedback to students.
- If possible, take records of their performance after formative assessment and verify the achievement of learning objectives.
- Conclude the lesson by announcing the key subtitles and giving a homework to students.

LESSON FROM UNIT

14

Puberty and Sexual relations

Subject: Biology Grade: S2

LESSON: Puberty and Sexual relations

TEACHING AND LEARNING MATERIALS: Drawings, manila papers, chalk and chalkboard, pens, books, etc.

DURATION: 40 minutes

SECTION/ STEPS	STEP -BY- STEP INSTRUCTIONS AND CONTENT	NOTICE TO THE TEACHER
1. Introduction (10 minutes)	<p>Teacher: Welcome to Biology lesson. I am sure you are going to enjoy today's lesson. Who can tell me the meaning of human sexual response?</p> <p>Students: Human sexual response is a series of changes that take place in the body in response to sexual stimulation.</p> <p>Teacher: What do you think we are going to learn?</p> <p>Students: We are going to study puberty and sexual relations.</p> <p>Teacher: Yes, we are going to start a new lesson, the new lesson is puberty and sexual relations.</p>	<ul style="list-style-type: none">– Begin by welcoming students and gaining their attention.– Give time learners to think on asked questions and allow them to provide their answers/ expectations.

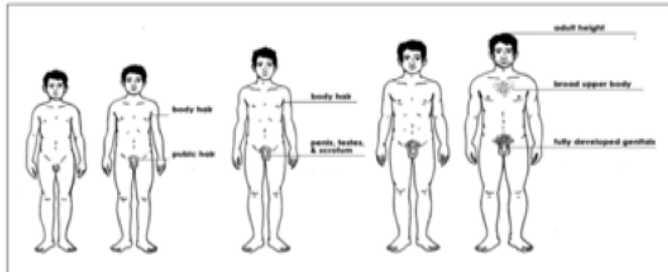
What are the stages in human sexual response?

This lesson will help you to attain the following objectives:

- Describe male and female sexual relation stimulation.
- Explain different ways couples can show love and affection.
- Outline responses to sexual attraction to sexuality.

Introductory activity

Teacher: Observe the following diagram and answer to the question.



What is the stage of growth of a people on the diagram?

Students: childhood, adolescent and adulthood stage.

Teacher: What is puberty?

Students: Puberty is the age at which a person is first capable of sexual reproduction.

- Give learners the opportunity and time to think on asked questions.

- Motivate the learners so that they can raise the question that answers a key question which is the symptoms and prevention as well as treatment of infectious diseases.

2. Lesson Development

Learning activity1.

Teacher: What are the main body changes during puberty?

Students: Body changes in boys and girls during puberty:

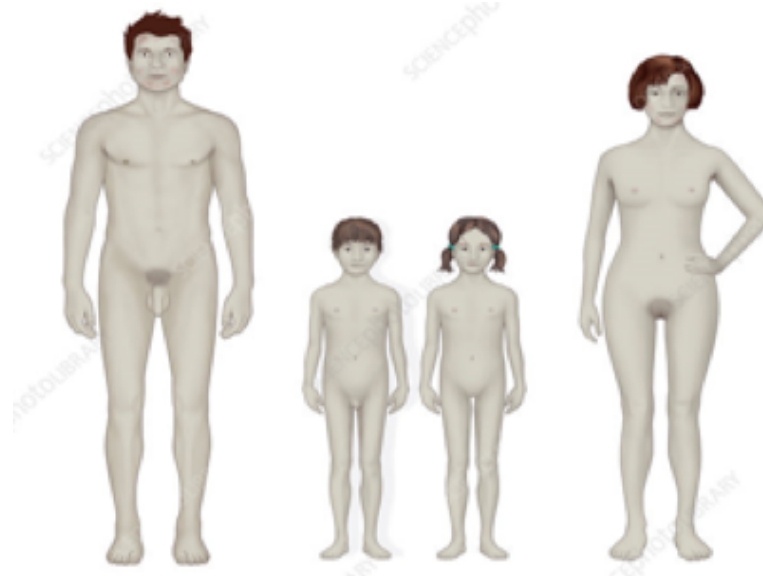
Hair grows on pubic region, under armpit, on face in boys

Broadening of hips in girls and muscle development in boys

Menstruations in girls and nocturnal ejaculation in boys

Development of genitals in both girls and boys

Emotional changes and feelings of sexual attraction



- Notes are read slowly to give students a chance to visualize.
- Check before if the chart and drawing are available.
- Students must be given time to think and note down their ideas.
- After each activity remember to put an energizer /warm up to capture learner's attention.

Teacher: What are the differences between changes in boys and girls during puberty

Students:

BOYS		GIRLS	
1	Testes and scrotum grow.	1	Breasts grow.
2	Pubic hair develops.	2	Pubic hair develops.
3	The body grows taller.	3	The body grows taller and curvier, and the hips widen.
4	Hair develops under the arms and on the face, body, arms and legs.	4	Hair develops under the arms and on the arms and legs.
5	Oil glands in the skin produce more oil, which can lead to pimples and acne.	5	Oil glands in the skin produce more oil, which can lead to pimples and acne.
6	The penis grows.	6	Menstruation begins.
7	Sweat production increases.	7	Sweat production increases.
8	Muscle growth occurs.		
9	The voice deepens.		

Application activity:

Teacher: Suppose a girl has a boyfriend. During weekend she goes to visit him. The boyfriend asks the girl to do sex as sign of love. what can you tell to this couple?

what could be the consequences if they do sex?

Students: Showing love to each other does not mean doing sex.

The consequences are getting pregnant, getting sexually transmitted diseases, leaving schools

– Students must be given time to think and note down their ideas.

– At each step, make a pause for students to think and say or write their ideas

– A break or a song!

3.
**Assessment
and conclusion**
(5 minutes)

Teacher: Define puberty.

Students: Puberty is the age at which a person is first capable of sexual reproduction.

Teacher: Name any 3 body changes on boys and girls at puberty age

Students: Pubic hairs, development of genital organs, menstruations in girls and sweet dreams in boys

Teacher: Discuss any 3 ways couples can show love and affection

Students: Sharing work to do, playing together, giving gift.

We are coming to the end of our lesson. We have mainly studied the meaning of puberty, the meaning of sexual relations, how one can show love and affection etc. Hope everyone has captured the key contents of the lesson.

You will do the following home work to enhance your competences.

Describe emotional changes that occur in boys and girls during puberty

Thank you for your participation in this lesson.

- Provide opportunities for students to ask questions.
- Provide opportunities for corrective feedback or positive feedback to students
- If possible, take records of their performance and verify the achievement of learning objectives.

LESSON FROM UNIT

15

Pregnancy prevention

Subject: Biology Grade: S2

LESSON: Contraceptives

TEACHING AND LEARNING MATERIALS: Charts, manila papers, chalk board, textbooks, etc.

DURATION: 40 minutes

SECTION/ STEPS	STEP –BY- STEP INSTRUCTIONS AND CONTENT	NOTICE TO THE TEACHER
1. Introduction (10 min)	<p>Teacher: Welcome learners to biology lesson. I am sure you are going to enjoy today lesson. Assuming that you have a friends who engage in bad sexual activities; Which are some of the risks that face them</p> <p>Student: Persons who engaged in sexual behavior may get pregnant or affected by sexual transmitted diseases</p> <p>Teacher: How can you avoid those risks?</p> <p>Student: To avoid those risks, some strategies are used: abstinence, use of condoms, drugs that prevent pregnancy.</p> <p>Teacher: What do you think we are going to learn?</p> <p>Student: We are going to learn contraceptive methods.</p> <p>Teacher: Yes, now we are going to start the new unit called “Pregnancy prevention”</p>	<p>Begin by gaining students’ attention and readiness.</p> <ul style="list-style-type: none">– Ask general questions on the new unit to know the students’ prerequisites.– Give time learners to think on asked questions and allow them to provide their answers/ expectations.

The key unit competence of this unit is To be able to apply knowledge of pregnancy prevention in sexual and reproductive decisions” .

The lesson of today is: Contraceptives

This lesson will allow you to attain the following objectives:

- Describe the meaning of the term contraceptive
- List types of contraceptives
- Describe the advantages of available methods of contraception

Introductory activity

Teacher: In our country, thousands of babies are born every year and by research, that number corresponds to the number of people living in one of the district of our country. Do you find this as a challenge? Explain.

Student: Yes, it is a challenge.

Teacher: What can be done to overcome that challenge?

Student: To overcome that challenge, contraceptive methods may applied

Teacher: Do you know some contraceptives?

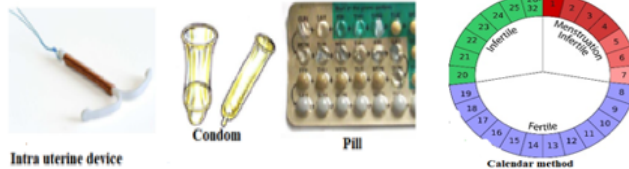
Student: Yes, like condom, pills

- Give learners opportunity to reflect on the activities’ questions.
- Allow learners to ask questions about the topic of the day.
- Motivate them and raise their interest in following carefully the lesson such that they can answer the key questions related to “By which means pregnancy prevention can occur?”

2. Lesson Development (25 min)

Learning activity 1

Teacher: Observe the chart that shows different methods of contraception



What are the things in the picture used for?

Student: The things observed on the picture are used for prevent pregnancy

Teacher: Are they good or bad? Why?

Student: Yes are good because they are used in preventing unintended pregnancy

Teacher: In your groups, discuss the following questions:

1. Describe the meaning of contraceptives?
2. Which types of contraceptive exist?
3. Classify contraceptives illustrated above on the picture above

Students presentation:

1. Contraceptive is a method, device or drug serving to prevent pregnancy
2. There are two types of contraceptive: Natural and artificial contraceptive
3. Based on the picture:

Artificial contraceptive: Intra-uterine device, condom and pill

Natural contraceptive: Calendar

- Chart must be placed where all students can observe clearly
- Students must be given time to discuss and note down their ideas.
- Always emphasize new concepts.
- Teacher makes group of 4 learners and asks learners to discuss about the questions
- Teacher ask learners to present their findings; one group present to the rest of the class

Learning activity 2

Teacher: In your groups, discuss the common myths about contraceptives and note down some points

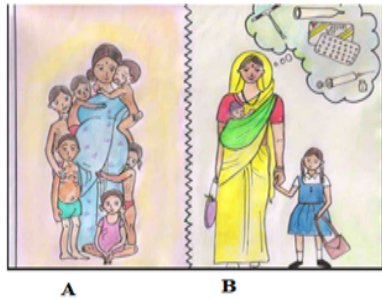
Students presentation:

Some of common myths about contraceptives:

- Birth control pills make women gain weight and can cause cancer.
- Being on the pill for a long time makes it harder to get pregnant later
- A girl cannot get pregnant when she has sex for the first time.
- Mothers who breast feed do not need to be on birth control pill.

Learning activity 3

Teacher: Observe carefully the following picture. Between A and B where contraceptives were used?



Student: It is on picture B that contraceptives were used.

- Ask others groups to add what are not mentioned by the presenter
- Note on the chalkboard what learners present till the list is complete
- -Build on learners' ideas to expand their knowledge.
- After each activity, remember to put an energizer/warm up to capture learners' attention.
- Use the same process as in the activity 1 to work on other activities.
- Use different questions to probe students to understand the content.

Teacher: List the importance of contraceptives

Student: Some of the importance of contraceptives are:

- Family planning
- Reducing unintended pregnancies and abortions
- Spacing of birth

Application activity:

Teacher: The problem of uncontrolled population growth is worldwide. It's more pronounced in developing countries. In what ways can the human population be controlled?

Student: The human population can be controlled by adopting contraceptive methods available or using natural methods

Teacher: What factors contribute to increase in teen pregnancy?

Student: Factors that contribute to teen pregnancy are peer influence, the media, lack of parenting, sexual abuse, lifestyle, rape

Teacher: What can you advise to young couples in order to give birth to the number of children they want.

Student: The advice to couples is to use the available contraceptives either natural or Family planning using different contraceptive methods available.

Lesson summary:

- Contraceptive is a method, device or drug serving to prevent pregnancy
- There are two types of contraceptive: Natural and artificial contraceptive

- Keep guiding learners in every step.
- Build a consensus after every activity and presentation.
- Request learners to answer the questions of application activity
- Help learners to relate what they have learnt to real life experience
- Provide opportunities for students to ask questions.

	<p>Example of Artificial contraceptive: Intra-uterine device, condom and pill</p> <p>Example of Natural contraceptive: Calendar</p> <ul style="list-style-type: none"> – Some of common myths about contraceptives: <ul style="list-style-type: none"> • Birth control pills make women gain weight and can cause cancer. • Being on the pill for a long time makes it harder to get pregnant later • A girl cannot get pregnant when she has sex for the first time. • Mothers who breast feed do not need to be on birth control pill – The importance of contraceptives: <ul style="list-style-type: none"> • Family planning • Reducing unintended pregnancies and abortions • Spacing of birth 	<ul style="list-style-type: none"> – Provide opportunities for corrective feedback or positive feedback to students. – If possible, take records of their performance and verify the achievement of learning objectives. – Conclude the lesson by announcing the key subtitles and giving homework to students.
<p>3. Assessment and Conclusion (5min)</p>	<p>Assessment questions:</p> <p>Choose the correct answer:</p> <p>Teacher:</p> <ol style="list-style-type: none"> 1. Family planning: <ol style="list-style-type: none"> a) Is a component of reproductive health b) Help couples having the number of children they want when they need them c) Is part of a strategy to reduce high maternal and infant mortality d) All of the above 	

Student: D

Teacher:

2. Contraceptives are used to:
 - a) To stimulate ovulation
 - b) To prevent occurrence of pregnancy
 - c) To stimulate digestion
 - d) To stimulate sperm formation

Student : B

Conclusion:

Teacher: We are coming to the end of our lesson. We have mainly studied the meaning of contraceptives, myths about contraceptives and importance of contraceptive. Hope everyone has captured the key content of this lesson.

You will do the following homework to enhance your competences:

1. Family planning should be compulsory. Discuss
2. Musabyimana has been using contraceptives to prevent unwanted pregnancy. She was shocked recently to discover she was pregnant. What could have gone wrong?

Thank you for your participation, see you next.

LESSON FROM UNIT

16

Transmission of STIs

Subject: Biology Grade: S2

LESSON: Reducing risk of STIs and HIV

TEACHING AND LEARNING MATERIALS: Charts, manila papers, chalk board, text books etc.

DURATION: 40 minutes

SECTION/ STEPS	STEP –BY- STEP INSTRUCTIONS AND CONTENT	NOTICE TO THE TEACHER
1. Introduction (7 min)	<p>Teacher: Welcome learners to biology lesson. I am sure you are going to enjoy today lesson. Based on skills and knowledge previously taught in senior 1 unit 11 classifications of diseases and infectious disease unit 12 Senior 2 What do you think will be happening when young people make unprotected sexual intercourse?</p> <p>Student: If a person makes unprotected sexual intercourse may face some sexual transmitted diseases if the partner is infected.</p> <p>Teacher: Do you know how sexual transmitted diseases pass from one person to another?</p> <p>Student: Yes, through blood and mucus during sex contact.</p> <p>Teacher: What do you think we are going to learn?</p> <p>Student: We are going to learn transmission of Sexual transmitted diseases.</p>	<p>Begin by gaining students' attention and readiness.</p> <ul style="list-style-type: none">– Ask general questions on the new unit to know the students' prerequisites.– Give time learners to think on asked questions and allow them to provide their answers/ expectations

Teacher: Yes, now we are going to start the new unit called “Reducing risks of STIs and HIV”

The key unit competence of this unit is “To be able to apply knowledge of STI and HIV transmission, prevention and treatment in sexual decision making”

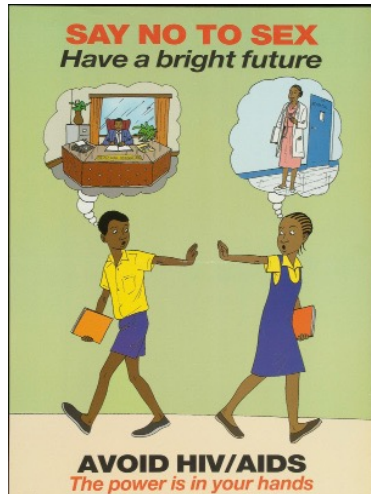
The lesson of today is: Transmission of STIs

This lesson will allow you to attain the following objectives:

- To describe means by which sexually transmitted diseases are acquired from person to person.
- Recognize symptoms and complications of STIs.

Introductory activity

Teacher: observe the following poster carefully. What message is being relayed in the poster?



- Connect the learners’ expectations related to this lesson to the key unit competence and lesson objectives.
- Ask learners the unit or lesson title.
- If learners do not announce them, announce and write them on the chalkboard.
- Communicate the key unit competence and lesson objectives.
- Give learners opportunity to reflect on the activities’ questions.

Student: This poster gives a message that it is not good to engage in sexual intercourse when you are still young because there are some negative impacts such as getting unintended pregnancy, diseases including HIV/AIDS.

Teacher: Alongside of HIV/AIDS you observe on the poster, do you know other diseases related to sex? Name some of them?

Student: Yes, some diseases related to sex are Chlamydia, Gonorrhoea and syphilis

Teacher: Do you know how those diseases are transmitted?

Student: Those diseases are transmitted by infected persons to healthy persons during sexual intercourse.

- Allow learners to ask questions about the topic of the day.

2. Lesson Development (25 min)

Learning activity 1

Teacher: Observe carefully the following picture. **What do you observe on the pictures?**



Student: Sexual behavior between persons that lead to sexual diseases that attack human genital parts

- Teacher group learners in 4 members based on gender, size of the class and abilities.
- Students must be given time to think and note down their ideas
- Use different questions to probe students to understand the content.

Teacher: What is STIs?

Student: STIs stands in full as sexual transmitted diseases, which transmitted through sex contact from an infected person to health person.

Teacher: What is the common transmission mode for all the STIs?

Student: The common way of transmission is unprotected sexual intercourse with infected person.

Activity 2

Teacher: Here is a list of diseases: Cancer, Chlamydia, Syphilis, malaria, diabetes, and gonorrhea. Work in group of four and identify in the list sexual transmitted diseases.

Student: sexual transmitted diseases in the above list are Chlamydia, Syphilis, gonorrhea

Teacher: Now, in your group, discuss about the following questions:

1. Discuss which diseases in the above list are STIs and suggest their different ways of transmission
2. Discuss their symptoms and complications

Students presentation:

1.
 - **Chlamydia** is transmitted via Oral, vaginal or anal sex and it can be passed to the infant during birth.
 - **Gonorrhea** is transmitted through Sexual contact with the penis, vagina, mouth or anus of an infected partner, Infected mother also transit it to baby during childbirth
 - **Syphilis** is transmitted through Vaginal, anal or oral sex

- Teacher give time learners to present their findings
- Teacher build on the students' ideas to expand their knowledge
- Always emphasize new concept
- After each activity, remember to put an energizer/warm up to capture learners' attention.
- During activities keep facilitate learners in every step
- Build a consensus after every activity and presentation.

2. Symptoms of the following STIs

STIS	SYMPTOMS & COMPLICATION
Chlamydia	In male <ul style="list-style-type: none">• Pain when passing out urine• White discharge from the penis In female <ul style="list-style-type: none">• Painful and frequent urination• Smelly yellowish and abnormal vaginal discharge
Gonorrhoea	<ul style="list-style-type: none">• Painful or burning sensation when urinating• Increase vaginal discharge
Syphilis	<ul style="list-style-type: none">• Small hard painless sores in the first stage• Rashes on the skin in the secondary stage• Paralysis in the tertiary stage

Application activity:

Teacher: Ana is 17 years old. After sex without she had got the problem of vaginal discharge but she has feared to disclose this to her mother even to go to the hospital. What advise can you give her if she talks to you about it as her friend?

Student: STIs may result in many complications like infertility or death if untreated so she must be advised to be open and visit doctors for treatment.

Teacher: Sugar mummies and sugar daddies lure young people with money and promise good life in exchange for sexual favor. Is this acts a way of transmitting STIs and HIV/AIDS? If yes how young people could behave?

Student: Yes. Abstinence is a good advice for them

- Request learners to answer the questions of application activity
- Teacher provide an opportunity where students can ask questions, where the teacher can help every learner depending on his/her special educational need

	<p>Lesson summary:</p> <ul style="list-style-type: none"> • Sexual transmitted infections are infections which are transmitted through sexual intercourse without protection with infected person to healthy person • Chlamydia, HIV/ AIDS, syphilis and gonorrhoea , are some examples of STIs • The common mode of transmission is unprotected sexual intercourse. • Other modes of transmission are through: blood, fluid, kissing, oral sex etc. 	
<p>3. Assessment and Conclusion (8min)</p>	<p>Questions of Assessment:</p> <p>Teacher: What is STIs in full?</p> <p>Student: STIs: Sexual transmitted infections</p> <p>Teacher: Give three examples of STIs, their mode of transmission and at least two symptoms for each case</p>	<ul style="list-style-type: none"> – Provide opportunities for corrective feedback or positive feedback to students. – If possible, take records of their performance and verify the achievement of learning objectives

Student:

STIS	MODE OF TRANSMISSION	SYMPTOMS
Chlamydia	Oral, vaginal or anal sex	<ul style="list-style-type: none">• Pain when passing out urine• Smelly yellowish and abnormal vaginal discharge
Gonorrhoea	Sexual contact with the penis, vagina, mouth or anus of an infected partner	<ul style="list-style-type: none">• Painful or burning sensation when urinating• Increase vaginal discharge
Syphilis	Vaginal, anal or oral sex	<ul style="list-style-type: none">• Small hard painless sores in the first stage• Rashes on the skin in the secondary stage

You will do the following homework to enhance your competences:

Why are the youths vulnerable to STIs?

Thank you for your participation, see you next.

- Conclude the lesson by announcing the key subtitles and giving a homework to students.

SAMPLE SCRIPTED LESSONS OF BIOLOGY S3

LESSON FROM UNIT

3

Water cycle

Subject: Biology		Grade: S3	TIME: 80 minutes
LESSON: Nutrient cycles TEACHING AND LEARNING MATERIALS: Chart of water cycle, senior 3 student's books, Chalk board, Kettle, source of heat, plate, Glass container, Soil			
SECTION/ STEPS	STEP -BY- STEP INSTRUCTIONS AND CONTENT		NOTICE TO THE TEACHER
1. Introduction (10 minutes)	<p>Teacher: Welcome to Biology lesson. I am sure you are going to enjoy today's lesson. Who can tell us the importance of water?</p> <p>Student: Water is used to cook, drink, wash</p> <p>Teacher: What would happen if there were no water on the earth?</p> <p>Student: Life would not be possible.</p> <p>Teacher: What do you think we are going to learn?</p> <p>Student: We are going to learn water cycle.</p> <p>Yes we start a new unit called Nutrient cycles</p> <p>The key unit competence of this unit is to be able to describe the water, carbon and nitrogen cycles.</p> <p>The lesson of today is Water cycle.</p>		<ul style="list-style-type: none"> – Start by gaining learners attention and motivating them. – Connect the learners expectations related to this lessons to the key unit competence and lesson objectives. – Give learners opportunity to reflect on the asked questions – Allow learners to ask questions about the topic of the day

This lesson will allow you to attain the following objectives:

- Describe the water cycle
- Interpret the chart of water cycle
- Appreciate the role of microorganisms in nutrient recycling

1. Introductory activity

Teacher: Observe the figure below and answer the following questions



Teacher: What can you observe on this figure?

Student: I can observe fogs.

Teacher: What can you observe on this figure?

Student: I can observe fogs.

Teacher: What is the source of fogs?

Student: Fogs are comes from condensed water droplets which are the result of the air being cooled to the point.

Teacher: At sunshine why does it go?

Student: At sunshine fogs are heated by sunlight and evaporate.

Teacher: Fogs went in which form?

Student: Fogs went in the form of water vapor(gas)

- Tell students the materials needed and give them time to take them
- Students must be given time to think to the experiment then note down their answers which will be analyzed by teacher and peers in order to give constructive feedback.

2.
Lesson
Development
(55 min)



Teacher: Observe this diagram and answer the following questions in pairs in five minutes (5min)

Questions

Teacher: What do understand by the term nutrient cycle?

Student: Exchange of organic and inorganic matter back into the production of living matter

Teacher: Where can we found fogs? What will happen to the water found at highest sun light?

Student: We can found fogs near creeks, waterways and river valleys. Fogs evaporates after sunrise as the sun warms the fog from the top down.

Teacher: Where does the energy that powers the water cycle come from?

Student: The energy comes from the sun.

Teacher: What is the correct term for rising water vapor meeting colder air and turning back into a liquid?

Student: The correct term is precipitation.

Teacher: How is water maintained in the environment?

Student: Water is maintained in the environment by living things by continuous cycling questions.

- Emphasize new concepts and at each step provide a pause time for students to think and say and do or write
- Use different questions to probe students to understand to content
- Question-Answer method
- The teacher request learners to be ready and follow carefully presentations and note key points.

Teacher: Where do clouds come from?

Teacher: Why nutrients are never finished from century to century?

Student: Nutrients never finished because when the organisms die they decompose and release the nutrients into the environment to be used by other organisms.

1. Clouds are formed from water vapor released by organisms and vapor from water bodies.

Learning activity

Teacher: You are going to do an experiment in groups of 5 students (20min)

Activity (3.1)

Demonstrating the process involved in cycling of water cycle

Requirement

- Water
- Kettle
- Source of heat
- Soil
- Plate
- Glass container

Procedure:

1. Fill a kettle halfway with water and cover it with a lid
2. Boil the water then remove the kettle lid.
3. Let the droplets of water lender Neath the kettle lid fall onto a plate containing soil.
4. When the soil on the plate is fully so asked, cover it with a glass container and place it in the sun.

- Provide review opportunities for students.
- Provide resources to learners.
- Give instructions to learners
- Ask learners to explore and record their findings.
- Ask learners to present their findings.

5. Write a report on your finding
6. Look at diagram of water cycle and answer the questions that follows:

Study questions

- i) Name the process that took that took place in procedures 2,3 and 4 in activity 3.1
- ii) Identify process that:
 - Release water back into the atmosphere
 - Take water from the atmosphere.
- iii) What are the main processes of water cycle?
- iv) What is the most important steps in the water cycle?

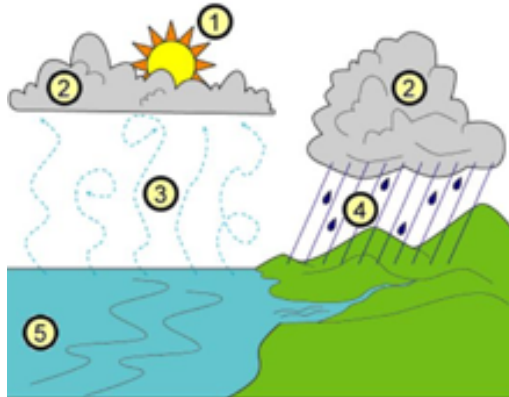
Students presentation

The water cycle involves the following process:

- a) Evaporation:** Liquid water from bodies of living organisms, the earth's surface and water bodies heats up and vapourises and rises up into the atmosphere as water vapour
- b) Condensation:** The water vapor in the atmosphere undergoes condition (the conversation of vapour or gas to or liquid) to form clouds
- c) Precipitation:** Condensed water is realized back to the earth in form of rain fall
- d) Infiltration:** After rainfalls, water goes to the ground to form rivers, springs wells, same water as taken by living organisms for use in their bodies.

- Provide opportunities for corrective feedback or positive feedback to learners
- The teacher guides learners during discussions and provide all the requirement for the activity.
- The teacher provides time and invites one student to present their findings group by group.

The flow of water over the whole environment forms a continuous cycle. The sun provides energy that drives water from one state to another in the water cycle.



All steps in the water cycle are important because they complement one another.

Application Activity.

Teacher: The following figure shows the main steps of water cycle.

Teacher: Observe carefully and answer the questions of application in pairs.(10min) **Questions**

Teacher: Take one minute to think about the uses of water and tell how it would be if there were no water on earth

Student: Without water life could not be possible because water is used in many things to make life possible.

- Write on chalkboard the learner's answers
- Teacher asks other learners to complement the previous presenter until the list is complete.
- The teacher build on learner ideas to expand their knowledge
- In details the teacher clarifies the process of water cycle and related notes

Teacher: Replace numbers by specific names.

Student:

1 = sunlight

2 = condensation

3 = Evaporation

4 = precipitation

5 = Infiltration

Teacher: Where do clouds come from?

Student: Clouds are formed from water vapor released by organisms and vapor from water bodies.

Teacher: How does pollution of water interfere with the water cycle?

Student: Pollution of water interfere with the water cycles when sewages agricultural lands, waste factories discharge in lakes rivers and these wastes contain harmful chemicals and toxins which make water poisonous for plants and animals. Pollutant from vegetation cut down the amount of heat reaching the oceans for evaporation

Teacher: Suggest what we can do to avoid water pollution.

Student: we can do the following:

- Reuse to fight against water pollution
- Avoid excessive use of chemicals in agriculture
- Avoid spillage of oils into water bodies
- Avoid to discharge wastes and sewages from home into the water.

– The teacher provide another activity for application

– The teacher allows learners to present their findings and orients the learners answers.

– Provide opportunities for students to ask questions

	<p>Summary</p> <p>Water cycle is the continuous process which involves evaporation condensation precipitation and collection process.</p> <p>Evaporation is the changing water to water vapor.</p> <p>Condensation is the conversion of water vapor into liquids as water droplets in clouds.</p> <p>Precipitation is the fall of water from clouds as rain and snow.</p> <p>Accumulation is the collection of water on the earth.</p> <p>During runoff excess water from precipitation that comes strains and rivers and carried to oceans and lakes.</p>	<ul style="list-style-type: none"> – The teacher helps learners to conclude on: – The main processes involved in water cycle.
<p>3. Assessment and conclusion (10 min)</p>	<p>Assessment questions</p> <p>Teacher: What are the main process involved in the process of water cycle?</p> <p>Student: The main processes involves in the process of water cycle are:</p> <ul style="list-style-type: none"> – Evaporation. – Condensation – Precipitation. – Infiltration <p>Teacher: What is evaporation/?</p> <p>Student: Evaporation is .the conversion of liquid water into vapor</p> <p>Teacher: What would be if there were no microorganisms on earth?</p> <p>Student: Recycling would be difficult because decomposing of dead organisms could not be possible. I</p>	<ul style="list-style-type: none"> – If possible take the record of their performance and verify their achievement of leaning objectives.

Conclusion

Teacher: We are coming to the end of our lesson. We have mainly studied the processes involved in water cycle. Hope everyone has captured the key content of this lesson.

You will do the following homework to enhance your competences:

Homework:

1. What do you understand by the term nutrient cycles?
2. How the human activities contribute to the water pollution and what can we do to avoid it?

Thank you for your participation, see you next time.

LESSON FROM UNIT

4

Negative impacts on ecosystem by monoculture farming

Subject: Biology	Grade: S3	DURATION: 40 minutes
LESSON: Effects of human activities on ecosystems 1		
TEACHING AND LEARNING MATERIALS: Photos of monoculture crops, chalkboard, student's books		
SECTION/ STEPS	STEP -BY- STEP INSTRUCTIONS AND CONTENT	NOTICE TO THE TEACHER
1. Introduction (10 min)	<p>Teacher: Welcome to Biology lesson. I am sure you are going to enjoy today's lesson. Who can tell us what we learnt last time?</p> <p>Students: Last time we learnt sustainable resources and development.</p> <p>Teacher: What does it mean sustainable development?</p> <p>Student: Sustainable development is the type of development that meet the needs of the present without compromising the ability of future generation to meet their own needs.</p> <p>Teacher: The lesson of today is: Negative impact on ecosystem by monoculture farming.</p> <p>This lesson will allow you to attain the following objectives:</p> <ul style="list-style-type: none">– Outline the negative effects of monoculture farming on ecosystem.	<ul style="list-style-type: none">– Begin by gaining students' attention and readiness.– Ask general questions on the previous lesson.– Give time learners to think on asked questions and allow them to provide their answers/ expectations.– Connect the learners' expectations related to this lesson to the key unit competence and lesson objectives.

- Name some chemicals such as fertilizers, pesticides and herbicides that pollute the environment.
- Describe how use of huge amount of fossil fuels on monoculture farms can result in climate change.

Introductory activity:

Teacher: This lesson will be easy for you as you have prerequisites needed like new methods of agriculture and remember that last time we visited corn plantation of Mr. Uwimana and we discussed there many things related to his plantation.

Teacher: Observe carefully the pictures bellow and answer to the questions.



Teacher: What are you observing on these pictures?

Student: We can observe, tea, corn plantations.....

Teacher: What type of farming system do they show?

Student: We are observing monoculture farming. .

- Ask learners the unit or lesson title.
- If learners do not announce them, announce and write them on the chalkboard.
- Communicate the lesson objectives.
- Allow learners to ask questions about the topic of the day.
- Link the learners’ expectations or answers to our lesson and the key unit competence and our lesson objectives.
- Give learners time to reflect on questions of introductory activity.
- Let learners to ask questions about the topic of the day and answer them.

	<p>Teacher: What are the methods used to increase food production?</p> <p>Student: The methods used to increase food production are two:</p> <ul style="list-style-type: none"> – Monoculture farming. – Intensive livestock farming. <p>Teacher: Are these methods environmentally friendly?</p> <p>Student: Those farming systems aim to maximize yield from available land through various means such as heavy mechanization and fertilizers.</p> <p>The way used is not environmentally friendly as it leads to environmental degradation.</p>	<ul style="list-style-type: none"> – Students must be given time to think and note down their ideas. – Always emphasize new concepts. – After each activity, remember to put an energizer/warm up to capture learners' attention for avoiding being bored. It means to motivate them.
<p>2. Lesson Development (25min)</p>	<p>Teacher: In groups of 4 students discuss and answer to the following questions;</p> <p>Learning activity:</p> <p>Activity 4.3 (student book p.46.)</p> <ol style="list-style-type: none"> 1. What do you understand by the term monoculture? 2. What types of chemicals are used in the farms? 3. What are the challenges the farmer(s) experiences? 4. What are the negative impacts to an ecosystem of monoculture production? 5. Using photographs related to environmental degradation, discuss with friends the causes, consequences and protective measures for degradation? <p>The teacher facilitates discussions in groups.</p>	<ul style="list-style-type: none"> – Use different questions to probe students to understand the content. – Keep guiding learners in every step. – Build a consensus after every activity and presentation. – If one learner gets wrong, invite another to continue.

Teacher: I think you finished your work. Let groups present their findings.

Students presentation:

1. Monoculture is the growing of a single crop over a large scale area

Examples: corn, wheat, soybeans, cotton, rice, tea....

2. Chemicals used in the farm are:

- Fertilizers
- Pesticides
- Herbicide

3. The challenges farmers experiences are:

- Bad weather
- Lack of market, soil erosion, manures, fertilizers, irrigation, and lack of mechanization.

4. Negative impacts to ecosystem by monoculture are:

- Susceptibility to pests
- Elimination of biological controls.
- Use of dangerous synthetic chemicals
- Soil degradation
- Use of fuel energy.

5. Causes of degradation; Population of humans, increase of per capita income and application of depleting and polluting technology.

Examples: corn, wheat, soybeans, cotton, rice, tea....

Negative environment impact of monoculture are:

i) Susceptibility to pests': Pests and weeds attack monoculture crops easily and adapt to the environment and develop resistance to chemicals used to control them.

- Write on chalkboard the learners' answers.

- Guide them until the whole formation of ovum and production of sperm explained well.

- The application activity helps learners to relate what they have learnt to real life experience

- Allow learners to present their answers

- Teacher orients the learner's answers.

- ii) **Eliminates biological controls:** The lack of diversity in a monoculture system eliminated all the functions that nature provides to plants and the soil.
- iii) **Use of dangerous synthetic chemicals:** Most of chemicals used to prevent damage to crops by weeds are inorganic and they pollute ground water .Organisms such as fish in water bodies may lack oxygen and die.
- iv) **Soil degradation:** Ground cover crops are eliminated meaning there is no natural protection soil, from erosion by wind and rain and the soil become unproductive from agriculture.
- v) **Use of fuel energy:** Many modern monoculture farms use machinery for their operations.

The machinery requires energy to function(use fossil fuels energy)

The industrialized mode of food production contribute to climate change.

Teacher: Thank you my learners, take your notebooks and do the following application activity.

Application activity.

Working in groups of two students each and answer the questions that follow;

1. You are selected as someone to advice people in your village on how can agriculture meet the world's growing .Need for food while doing less environmental harm.
What will be your concern?
2. What is the major role played by tractors in increased productivity?

3. Why is excessive use of insecticides bad for the environment?
4. What are the consequences of growing primarily single varieties of common food crops?
5. You are a member of the environment club in your school.
 - a) What is the importance of being a member of that club?
 - b) How can you impact your community with the knowledge obtained from this lesson?

Student presentation:

1. Our concern will be to advise people to;
 - Use less pesticides.
 - Create new and sustainable food system.
 - Use indoor agriculture.
2. Tractors increase size of cultivated area in short time.
3. Use of chemicals such as insecticides pollute the environment and kills untargeted organisms such as fish.
4. The consequence of growing a single variety are the following:
 - Susceptible to pests.
 - Use of dangerous synthetic chemicals.
 - It leads to soil degradation
5. **A)** The importance of being a member will help to protect our school environment and educate people around us.
b) We will impact our communities by doing different activities regarding environment like planting trees and educating them on how to conserve environment sustainably.

	<p>Summary of the lesson</p> <p>Monoculture is the fact of growing a single crop over a large area, mostly corn wheat, rice, maize, soybeans.</p> <p>Monoculture aims to maximize food production: It is large scale commercial farming.</p> <p>To maximize yields, monoculture farms uses machinery that run with fossil fuel energy, fertilizers, herbicides and pesticides that pollute the environment if used in excess.</p> <p>The Used chemicals can leave traces on plants that are intended for human consumption, but they can also enter the food chain leach through the soil, eventually polluting groundwater supplies, and altering ecosystems. In combination with the chemical fertilizers and pesticides, the industrialized mode of food production (in which monoculture is as example) is a major contributor to climate change and global warming</p>	<ul style="list-style-type: none"> – Provide opportunities for corrective feedback or positive feedback to students. – Records the performance of learners and verify the achievement of learning objectives.
<p>3. Assessment and conclusion (5min)</p>	<p>Assessment questions</p> <p>Teacher: We are coming to the end of our lesson. As we conclude let's review some of the key point that we learnt.</p> <p>Teacher: Define the term monoculture.</p> <p>Student: Monoculture is the fact of growing a single crop over a large area.</p> <p>Teacher: Identify the negative effects of monoculture farming on ecosystem.</p> <p>Student: Negative effects of monoculture farming on ecosystem include:</p> <ul style="list-style-type: none"> – Susceptibility to pests. – Eliminates biological control. – Use of harmful chemicals. – Soil degradation. – Use of fossil fuels 	<ul style="list-style-type: none"> – If possible, take records of their performance after formative assessment and verify the achievement of learning objectives. – Conclude the lesson by announcing the key subtitles and giving a homework to students.

Teacher: State at least three types of chemicals used in farming that pollute environment.

Student; Examples of chemicals used in farming :

- Fertiliser
- Pesticides
- Insecticides

Teacher: Explain how the use of huge amount of fossil fuels on monoculture result to climate change

Student: The use of fossil fuels energy in farming emit a high amount of carbon dioxide in the atmosphere which result to global warming and climate change.

LESSON FROM UNIT

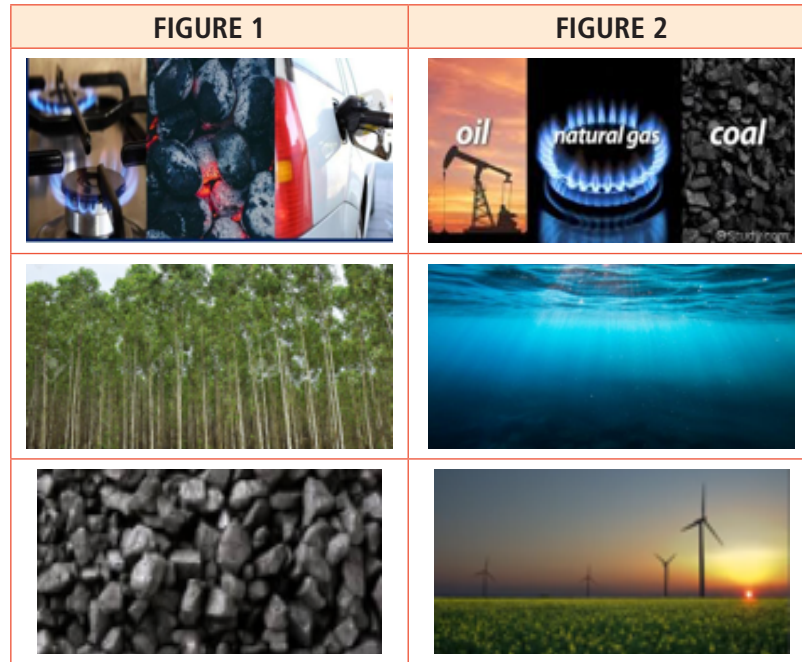
5

Description of non-renewable resources

Subject: Biology	Grade: S3	DURATION: 40 minutes
LESSON: Effects of human activities on ecosystem 2		
TEACHING AND LEARNING MATERIALS: Photographs, chalkboard, student books		
SECTION/ STEPS	STEP –BY- STEP INSTRUCTIONS AND CONTENT	NOTICE TO THE TEACHER
1. Introduction (10 minutes)	<p>Teacher: Welcome to Biology lesson. I am sure you are going to enjoy today's lesson. Who can tell us what we learnt last time?</p> <p>Students: Last time we learnt about sustainable resources and development.</p> <p>Teacher: How does sustainable development make economic sense of society?</p> <p>Students:</p> <ul style="list-style-type: none"> – Reduces the use of non-renewable resources. – Allows renewable resources to be used in perpetuity <p>The lesson of today is: Description of non-renewable resources.</p> <p>This lesson will allow you to attain the following objectives</p> <ul style="list-style-type: none"> – Describe what the non-renewable resources are. – Outline non-renewable resources. – Compare human effects on protected and unprotected areas. 	<ul style="list-style-type: none"> – The teacher begins by gaining student's attention and revising pertinent skills and knowledge previously taught and communicate objectives of the lesson – Announce the title of the lesson – The teacher display different photos relating to lesson of the day.

Introductory activity

Teacher: Observe the following photos. What do you see on these photos?



Teacher: What can you observe on the photos?

Student: I can observe natural gas

- I can observe coal,
- I can observe a forest. Teacher.

Teacher: What is the difference between a forest and a natural gas in terms of their existence?

Student: A forest can be replanted when it is cut down but a gas cannot be replenished when it is used.

- Give learners opportunity to reflect on the introductory questions.
- Allow learners to ask question about the topic of the day.
- Build on their questions and communicate the key questions
- Pause to allow students to get their materials before moving
- Give time learners to think on asked questions and allow them to provide their answers.
- Connect the learners expectations related to this lesson to the key unit competence and lesson objectives.
- Students must be given time to think and note down their ideas. Emphasize new concepts

2. Lesson Development
(25 minutes)

Learning activity

Teacher: In group of four students discuss about the following questions:

1. What are non-renewable resources?
2. Outline three examples of non-renewable resources.
3. What is fossil fuel?
4. How can we conserve non-renewable resources?
5. Differentiate non-renewable resources from renewables ones using examples.

Student presentation:

Non-renewable resources are resources for which have limited supply. The supply comes from the earth itself and as it typically takes millions of years to develop.

Among non-renewable resources we have fossil fuels (figure number 1), ground water (figure number 4) and metal ores (figure number 5)

Renewable resources are replenished naturally and over relatively short period of time. Examples solar energy, wind, hydroelectricity, biomass

Fossil fuels are natural fuels such as coal or gas formed in the geological past from the remains of living organisms. We can conserve nonrenewable resources by using renewable ones.

Application activity.

Teacher: In groups of two students each of the questions that follow;

Teacher: Among the given resources below, which resources can be

- A) Renewable resources?

- At each step, make a pause for students to think and say or write their ideas.
- Allow students to ask questions about the topic of the day.
- Ask learners to observe the images and answer the questions under them.
- Ask learners to present their findings
- Build on learners' ideas to expand their knowledge
- A break or a song!
- The teacher requests learners to observe carefully the photos and answer to the asked questions in pairs.

B) Non-renewable resources?

Stone, timber, methane gas, solar power, sugar cane, bamboo forest, hydroelectric power, coal.

Student: a) Timber, solar power, sugarcane bamboo forest.

b) Stone, methane gas, hydroelectric power, coal.

Teacher: Do you think that it is possible to conserve non-renewable resources?

Student: Yes it is possible by using renewable resources

Teacher: Is it advantageous to conserve non-renewable resources?

Student: Yes because non-renewable resources are very important in our life and when they are not conserve they can extinct.

Teacher: With examples, explain how we can conserve non-renewable resource

- Student.** – Reducing consumption of over-packaged production.
– Walking, bicycling, or using public transit instead of your car.

Lesson summary:

Non –renewable resources are resources which cannot be renewed to sustain social and economic development.

They include; ground water, metal ores, and fossil fuels such as natural gas coal and petroleum. Fossil fuels were made from the remains of organisms which died long time ago. Fossil fuels are the main source of energy for industries, Moto vehicles, and other machineries. Therefore there is need to conserve fossil fuels.

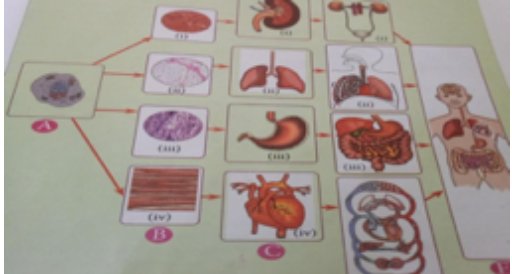
- Provide an opportunity where students can ask questions, where the teacher can help every learner depending on his/ her special educational needs, and ask some questions leading students to summarize the lesson learnt.
- The teacher asks learners to present their findings/ answers.
- Note on the chalkboard what learners present.
- The teacher ask other learners to complement the previous presenter until the list is complete.
- The teacher build on learners 'ideas to expand their knowledge by giving more clarifications on the content
- Always emphasize new concepts.

	<p>Conservation of fossil fuels can be done by exploring alternative sources of energy which are renewable such as hydroelectricity, wind, geothermal, thermoelectricity, alcohol....</p> <p>Use of fossil fuels as source of energy has been shown to lead to Climate change and contribute to global warming because they emit huge amount of carbon dioxide and carbon monoxide in the atmosphere.</p> <p>Therefore there is need to conserve fossil fuels. Conserving fossil fuel help to reduce greenhouse emissions and lowering global warming. Destroyed forests can be replanted. Diminished fish stock in ponds can be replenished by introduction of fishing.</p>	<ul style="list-style-type: none"> - After each activity remember to put a worm up to capture learner's attention. - The teacher helps students to conclude using questions. - Use different questions to probe students to understand the content.
<p>3.Assessment, and conclusion (5minutes)</p>	<p>Assessment questions</p> <p>Teacher: Describe non-renewable resources.</p> <p>Student: Non-renewable resources are resources which cannot be regenerated or renewed fast enough for sustainable development.</p> <p>Teacher: Outline three examples of non-renewable resources</p> <p>Student: Examples of non-renewable resources are fossil fuels, mineral ores and underground water.</p> <p>Teacher: What are dangers of overusing fossil fuels?</p> <p>Student: When fossil fuels is burnt it releases a lot of greenhouse gases such as carbon dioxide into the atmosphere</p> <p>Teacher: Why do we need to conserve non-renewable resource</p> <p>Student: We need to conserve non-renewable resources because if they are not conserved they cannot be replenished.</p>	<ul style="list-style-type: none"> - Assess learners basing on the key questions to verify the achievement of objectives. - Conclude the lesson by announcing the key subtitles and giving a homework to students - Keep guiding learners in every step. - Note on the chalkboard what learners present The teacher may use photos to define non-renewable resources and give examples of them.

LESSON FROM UNIT

6

Chromosomes and haploid and diploid conditions of a cell

Subject: Biology	Grade: S3	TIME: 80 minutes
LESSON: Mitosis and Meiosis TEACHING AND LEARNING MATERIALS: Charts of micrographs of cells at different stages of mitotic and meiotic cell division, Textbooks, handouts, Chalkboard, charts of cell division at different stage		
SECTION/ STEPS	STEP –BY- STEP INSTRUCTIONS AND CONTENT	NOTICE TO THE TEACHER
1. Introduction 10 minutes	<p>Teacher: Welcome to Biology lesson. I am sure you are going to enjoy today's lesson. I want you to observe carefully the diagram below and answer to the questions.</p>  <p>Figure 1</p> <p>Teacher: What are you observing on this diagram? Student: I can see different organs.</p>	<ul style="list-style-type: none">– Begin by gaining students' attention and readiness.– Ask general questions on the new unit to know the students' prerequisites.

Teacher: How does one cell develop into an organ with many cells?

Student: One cell develop into an organ by cell division.

Teacher: Which part of a cell controls all its activities?

Student: The part of the cell that controls all its activities is called nucleus

Teacher: Where are chromosomes found?

Student: Chromosomes are found in the nucleus of a cell

Teacher: What do you think we are going to learn in this unit of mitosis and meiosis?

Student: We are going to learn cell division.

Teacher: We start the new unit called "Mitosis and meiosis."

The key unit competence of this unit is "To be able to explain the different processes of cell division and their implication on living things".

The lesson of today is: Chromosome, haploid and diploid conditions of the cell.

This lesson will allow you to attain the following objectives

- Recall and define DNA and Chromosome.
- Differentiate haploid and diploid conditions of a cell.
- Observe from the charts and identify diploid and haploid state of a cell.
- Appreciate the importance of mitosis and meiosis in living things.

- Give time learners to think on asked questions and allow them to provide their answers/ expectations.

Introductory activity

Teacher: Observe carefully the following diagram and answer to questions that follow:

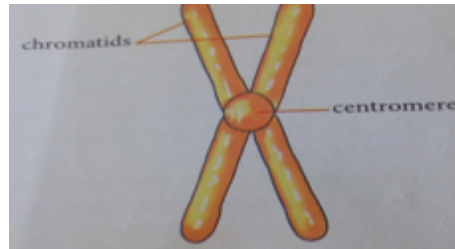


Figure 2

Teacher: What is the name of this diagram?

Student: The name of this diagram is chromosome.

Teacher: What do you think we are going to learn?

Student: We are going to learn chromosome.

- Connect the learners' expectations related to this lesson to the key unit competence and lesson objectives.
- Ask learners the unit or lesson title.
- If learners do not announce them, announce and write them on the chalkboard.
- Communicate the lesson objectives.
- Allow learners to ask questions about the topic of the day.
- Link the learners' expectations or answers to our lesson and the key unit competence and our lesson objectives.

2. Lesson
Development
60 minutes

Activity 1: Structure of a chromosome.

Teacher: Observe carefully the diagram below and answer to the questions in pairs.



Figure 3

Questions.

1. What is chromosome?
2. Where chromosomes are found?
3. What contains chromosomes?

Students presentation:

1. Chromosomes are fine coiled and thread like structures in the nucleus of a cell.
2. Chromosomes are found in the nucleus of a cell.
3. Chromosomes contains DNA.

Teacher: Very good my learners. As you have said, Chromosomes are fine coiled and threadlike structures in the nucleus of a cell. Chromosomes contains hereditary information called DNA.

DNA (deoxyribonucleic acid) influence development and characteristics of each organism.

In the nucleus, chromosomes occur in pairs. These pairs of chromosomes are called **homologous chromosomes**.

Chromosomes appear to have split along their lengths to form two similar strands joined at their centers.

These two strands are called **chromatids** and where they join is called **centromere**.

Chromosome number vary according to the type of cell in the organisms

Examples: human being has 46 chromosomes.

- Chimpanzee has 48 chromosomes.

– Give learners time to reflect on questions of introductory activity.

– Let learners to ask questions about the topic of the day and answer them.

– Students must be given time to think and note down their ideas.

– Always emphasize new concepts.

- Dog has 78 chromosomes.
- Tomato has 24 chromosomes.
- Apple has 34 chromosomes

Students may ask questions for more clarifications.

Activity 2. Diploid and haploid conditions of a cell.

Teacher: Observe carefully the diagram below and answer to the following thinking questions. In pair

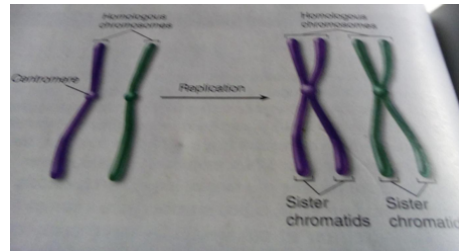


Diagram 1

Diagram 2

Teacher: What is the difference between diagram 1 and diagram 2?

Student: On the diagram 1 there is one set of chromosomes while in diagram there two sets of chromosome.

Teacher: very good my students, it is clear!

When the cell contains two sets of chromosomes, this is called diploid cell. It is represented as $2n$ (number of chromosome This is a characteristic number of chromosomes found in the somatic (body) cells of an organism. Example: human has 46 chromosomes.

When the cell contains one set of chromosome, this is called haploid cell. It is represented as n (number of chromosome is 1)It is a characteristic of the gametes of the specie Example: human has 23 pairs of chromosomes

– After each activity, remember to put an energizer/warm up to capture learners' attention for avoiding being bored It means to motivate them.

– Use different questions to probe students to understand the content.

– Keep guiding learners in every step.

– Build a consensus after every activity and presentation.

Activity 3: Types of cell division

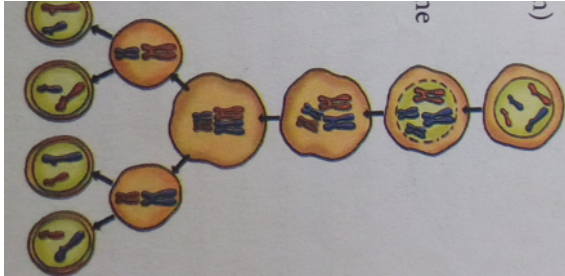


Figure 5

Questions

1. What are the types of cell division?
2. What is the use of mitosis cell division?
3. What is meiosis cell division?

Expected answers for learners.

1. The types of cell divisions are mitosis and meiosis.
2. Mitosis is used in growth, repairing tissues.
Replacing old cells and vegetative reproduction.
3. Meiosis is a specialized type of cell division that reduces the chromosome number by half from diploid to haploid number.

Learning activity 4 (In groups of five students)

Analogy of replication of chromosomes during cell division.

- If one learner gets wrong, invite another to continue.
- Write on chalkboard the learners' answers.
- Guide them until the whole formation of ovum and production of sperm explained well.

Requirements

- Two twisted ply wool(a rope or twine may also be used)

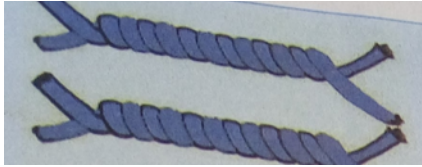


Figure 6

Procedure

1. Untwist the first wool or rope from one end as shown below.

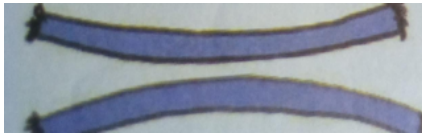


Figure 7

2. Untwist the second wool or rope from one end as shown below



Figure 8

3. Answer the questions below.

- a. How many sets of twisted colored ply wool did you start with?
- b. How many sets of untwisted wool did you end up with?
- c. Relate your findings in this activity to what happens inside the nucleus of a cell.

- Provide opportunities for students to ask questions.

Student presentation.

- 3a. We started with two sets.
- 3b. We end up with four untwisted wool.
- 3c. Chromosomes inside the nucleus replicate in a similar manner.

From two strands of wool they end up with four untwisted ropes which is similar to what happens to chromosomes during cell division.

Application activity

Teacher: Answer the questions for the activity in pair:

1. The number of chromosomes is one of the characteristics of an individual species. For each species the number of chromosomes has to remain constant.
2. Why do think the number of chromosomes has to remain constant in the species from generation to generation? What would happen if there were no cell division?
3. In which phase do replicated chromosomes appear?
4. The following are parts of an organism cell, organ, system, tissue, chromosome. Arrange them in decreasing order of size.
5. A diploid cell having 48 chromosomes. What is its haploid number

Student presentation

1. The number of chromosomes has to remain constant from generation to generation because any change in the number or structure of the chromosomes can lead to mutation and change in the species. So the number has to remain constant so as to keep the species changing from generation to generation

2. There would be no life because no growth would happen.
3. The phase of replication of chromosome is interphase
4. Organism-system-organ-tissue-cell-chromosome
5. Haploid number is 24.

Summary of the lesson

The cell has the nucleus which contains DNA. Chromosomes occur in the nucleus in pairs. These pairs are called homologous chromosomes. Homologous chromosomes are two chromosomes one of the paternal origin the other of maternal origin. That are identical in appearance. The cell which has one set of homologous chromosomes is said to be haploid. The cell which has two sets of homologous chromosomes is said to be diploid cell. There are 23 pairs of chromosomes in every cell of human being one set is inherited from father one set is inherited from the mother. When the cell contains two sets of chromosomes, this is called diploid cell. It is represented as $2n$ (number of chromosome This is a characteristic number of chromosomes found in the somatic (body) cells of an organism. Example: human has 46 chromosomes.

When the cell contains one set of chromosome, this is called haploid cell. It is represented as n (number of chromosome is 1) It is a characteristic of the gametes of the specie Example: human has 23 pairs of chromosomes.

N. B Normal body cells are diploid ($2n$) with 46 chromosomes.

Gametes are haploid (n) with 23 chromosomes.

- Provide opportunities for corrective feedback or positive feedback to students.
- Records the performance of learners and verify the achievement of learning objectives.

3. Assessment and Conclusion

10 min

We are coming to the end of our lesson. As we conclude, let's review some of the key points that we learnt about chromosomes, haploid and diploid conditions of a cell

Assessment questions

1. Define the following terms used in cell division.
a) Chromosome c) Diploid
b) Haploid d) DNA
2. What is the difference between diploid and haploid conditions of a cell?
3. State at least three importance of cell division

Expected answers for the learners.

1. A. Chromosome is a thread like structure in the nucleus of a plant.
B. Haploid it is an organism or a cell. That complies of a single set of chromosomes.
C. Diploid is a cell containing a double set of chromosome.
D. DNA is the hereditary material that influence development and characteristic of an organism.
2. Diploid cell have two sets of chromosome while haploid cell have one set of chromosomes.
3. Importance of mitosis are:
 - Growth
 - Repair
 - Reproduction

- If possible, take records of their performance after formative assessment and verify the achievement of learning objectives.
- Conclude the lesson by announcing the key subtitles and giving a homework to students.

Homework

Now I want to give you a homework assignment so that you try to apply some of what we have learned today.

The home work of today is found on page 82 of biology student book Self-evaluation test 6.1

Thank you for your participation in this lesson.

LESSON FROM UNIT

7

Absorption and assimilation of nutrients

Subject: Biology	Grade: S3	DURATION: 40 minutes
LESSON: Heterotrophic nutrition		
TEACHING AND LEARNING MATERIALS: Wall charts, flash cards, manilla paper, chalk board, textbooks, video from youtube, etc.		
SECTION/ STEPS	STEP –BY- STEP INSTRUCTIONS AND CONTENT	NOTICE TO THE TEACHER
1. Introduction (10 minutes)	<p>Teacher: Welcome to biology lesson. I'm sure you are going to enjoy today's lesson. - Who can tell us the importance of eating in everyday for living things?</p> <p>Student: Living things need nutrients and energy from food.</p> <p>Teacher: What is the part of human body that helps in absorption and assimilation of nutrients?</p> <p>Student: The small intestine helps in absorption and assimilation of food.</p> <p>Teacher: What other parts of small intestine involved in absorption and assimilation of food.</p> <p>Student: The villi.</p> <p>Teacher: Suppose the food you have eaten is fully digested but not absorbed, what do you think will occur in the small intestine?</p> <p>Student: The body will not get necessary and needed nutrients.</p>	<ul style="list-style-type: none"> - Give time learners to think on asked questions and provide their answer expectations. - connect the learners expectations related to the key unit competence lesson objectives. - allow learners to ask questions about the topic of the day.

Teacher: What do you think we are going to learn?

Student: We are going to learn “absorption and assimilation of nutrients.

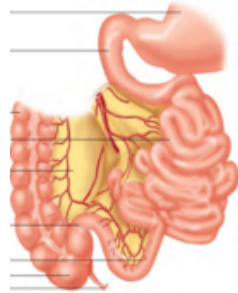
This lesson will allow to attain the following **Learning objectives:**

- Explain absorption and assimilation of nutrients.
- Describe the structure of the ileum and the villus.
- Show concern about the hygiene of digestive system.

- Announce and write the lesson title.
- communicate the lesson objectives.
- motivate them and raise their interest

Introductory activity

Teacher: Observe the chart below and write your observations: The human digestive system consists of different parts. which one represented by the diagram above?



Student: Small intestine

Teacher: Write down the main parts of the small intestine.

Student: Duodenum, jejunum, and ileum.

Teacher: Outline the modifications of the ileum that makes it suitable to absorb digested food.

Student: villi

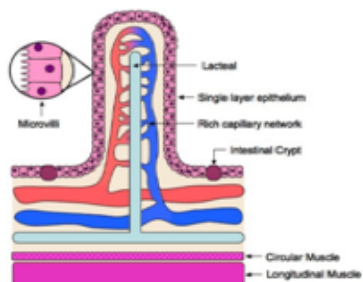
- -Give learners’ opportunity to reflect on the activities’ questions
- -Allow learners to ask questions about the topic of the day.
- -build on their questions to communicate the key question.
- -Motivate them and raise their interest in the following carefully lesson such that they can answer the key questions related to how small intestine helps in absorption and assimilation of digested food.

2. Lesson Development (25 min)

Learning activity 1:

Teacher: Request learners to watch the video carefully and answer the following questions.

Or Teacher display the wall chart and ask learners to observe then answer the questions below.



1. What is the function of the villi in the small intestine?
2. How are the villi suited to their function?
3. What is the difference between absorption and assimilation?

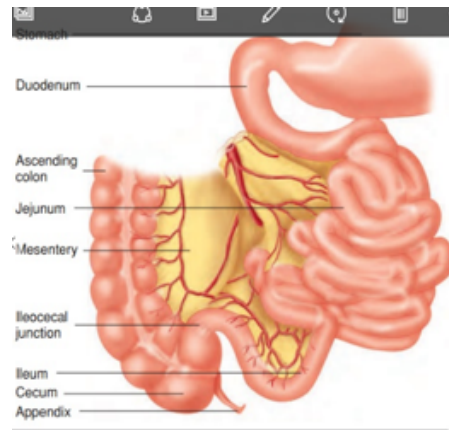
Learners' answers:

1. To increase the surface area for absorption and secretion in the Small intestine.
2. The villi are many in number therefore increasing the surface area for digestion. The villi have numerous blood capillaries which aid in absorption of large amount of food materials.
3. Absorption is the movement of digested food from the ileum to the blood stream while assimilation is the process of turning absorbed food into body tissues and energy.

- The chart is clear, shaded and coloured on the wall.
- Check before if the wall charts, scotch are available.
- Check before if the video has good sound and pictures to give students a chance to visualize.
- Tell learners that they are going to watch a video which is on the link provided.

Activity 2

Teacher: In your groups, observe the diagram displayed and identify the main parts of the small intestine involved in absorption and assimilation of digested food. you will do that by matching the letters of the diagram with the names of the represented parts according to their description.



Application activity

Teacher request learners to answer the questions of application activity:

- Live one day without eating and tell how you feel.
- As healthy practices ,why people are advised to eat regularly?
- Active body consumes /uses more food than a weak body.

Summary /notes

- Describing absorption and assimilation of digested food.
- Absorption of digested nutrients

- Display the video by clicking on the link “absorption and assimilation
- Students must be given time to think and note down their ideas.
- Always emphasize new concepts.
- After each activity , remember to put an energizer/ warm up to capture learners’ attention.

Application activity

Teacher request learners to answer the questions of application activity:

- Live one day without eating and tell how you feel.
- As healthy practices ,why people are advised to eat regularly?
- Active body consumes /uses more food than a weak body.

Summary /notes

- Describing absorption and assimilation of digested food.
- Absorption of digested nutrients

Take place in the small intestine specifically in the ileum.The wall of the ileum contains numerous finger-like projections called“villi”.

Amino acids and glucose pass through the walls of the blood vessels and into the blood, which transports them into the liver.

Fatty acids and glycerols pass through the lacteal and recombine to form globules which are carried by lymph and passed in to the bloodstream.

- Assimilation of nutrients

Nutrients are absorbed and transported to all parts of the body,this process is called assimilation . During assimilation:

- **Glucose** : is used by the cells to produce energy.
- **amino-acids**: which enter the cells are converted to protoplasm and used for growth and repair of the body.
- **Glycerol and fatty acids**: are used for the cells for building protoplasm and cell membrane.

- Use different questions to probe students to understand the content.

- keep guiding learners in every step.

- Build a concesus after every activity and presentation.

- Provide opportunities for students to ask questions.

- Provide opportunities for corrective feedback or positive feedback to students.

**3.Assessment
and Conclusion
(5 min)**

Formative assessment

Teacher:

1. What is the difference between absorption and assimilation?
2. The following examples are substances which are not directly absorbed except:
 - A. Vitamins and water.
 - B. Vitamins, proteins and water.
 - C. vitamins , dissolved minerals and water.
 - D. Proteins, lipids and water
3. Nutrients absorbed in to the blood of intestinal villi goes to:
 - A. Aorta
 - B. Pulmonary vein
 - C. hepatic portal vein
 - D. Hepatic artery

Learners' answers

1. Absorption is the movement of digested food from the ileum to the blood stream while assimilation is the process of turning absorbed food in to body tissues and energy.
2. C
3. C

Teacher: We are coming to the end of our lesson. we have mainly studied the absorption and assimilation of nutrients, the main parts of small intestine and the mechanism by which absorption and assimilation occurs. After eating, the body breaks down food during digestion, absorbs the nutrients and distributes them to cells during assimilation.

- If possible , take records of their performance and verify the achievement of learning objectives.
- Use the ideas given by learners during formative assessment, enrich their feedback to summarize the lesson.

Assimilation gets the nutrients from the food to the cells where they are used for growth and repair. Hope that everyone has captured the key content of this lesson.

Homework

1. Explain how are the villi suited to their function.
2. How are the nutrients absorbed and used by the body?

Thank you for your participation in this lesson.

LESSON FROM UNIT

8

Heart rate, coronary heart diseases, benefits of balanced diet and physical exercises

SUBJECT: Biology		Grade: S3	TIME: 40 minutes
LESSON: circulatory system in humans			
TEACHING AND LEARNING MATERIALS: chart of human heart and blood vessels , textbooks ,illustrations,			
SECTION/ STEPS	STEP –BY- STEP INSTRUCTIONS AND CONTENT		NOTICE TO THE TEACHER
1. INTRODUCTION (10 MIN)	<p>Teacher: welcome to biology .i am sure you are going to enjoy today’s lesson. who can tell us the importance of eating a balanced diet and doing exercises for the circulation?</p> <p>Students: to fight against coronary heart disease</p> <p>Teacher: What are the parts of humanbody that helps in circulation?</p> <p>Students: The heart ,lungs and the blood vessels.</p> <p>Teacher: What do you think about if you are forced to run faster?</p> <p>Students: The heartbeat increases</p> <p>Teacher: What do you think we are going to learn</p> <p>Students: we are going to learn “Heart rate, coronary heart diseases ,benefits of balanced diet and physical exercises”</p>		<ul style="list-style-type: none"> – -Organize each of the items listed logically – Begin by gaining students’ attention and readiness. – Ask general questions on the new unit to know the students’ prerequisites.

This lesson will allow to attain the following Learning objectives :

- Describe coronary heart diseases
- Demonstrate the effect of physical activity on the pulse rate.
- Adopt a culture of maintaining physical fitness and health.

Teacher: Think of a situation where a learner is forced to move faster in athletic competition organized at the school level, what do you think about the heartbeat before and after running?

Students: Heart rate will increase slowly by slowly.

Activity 1.

Investigate pulses/heartbeat prior and after physical exercises using the following diagram and request learners to answer the following questions:



Teacher: The human circulatory system consists of different parts. Which one is represented by the diagram above?

Students: Pulmonary circulation

Teacher: Write down the main organs of this diagram.

Students: The lungs, the heart and the blood vessels.

Teacher: What activities can affect the heart rate?

Students: balanced diet, exercises

– Give time learners to think on asked questions and allow them to provide their answers/expectations.

– Pause to allow students to get their materials before moving on.

– Notes are read slowly to give students a chance to visualize.

2.
Lesson
Development

(25 min)

Learning activity 2: Teacher: Ask learners to explain the causes and the risk factors of the coronary heart disease.

Teacher: Tell learners to open their textbooks and answer the following questions.

Learners: open textbooks and answer the following questions

Teacher: What causes the coronary diseases?

Students: Eating of unbalanced diet, lack of exercises

Teacher: Give situations where your pulse rate can increase without any physical activity/?

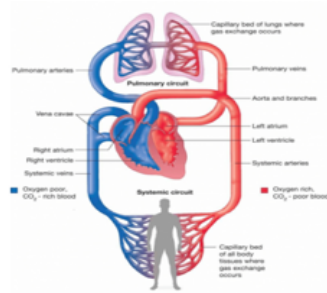
Students: Through a forced running

Teacher: Why is it necessary to know your pulse rate?

Students: To control yourself as regular medical check up

Learning activity 3: **Teacher:** ask learners to Investigate the effect of physical activity on the pulse rate. **Using the diagram below**

Students: investigate the effect of physical activity on the pulse rate.



– Students must be given time to think and note down their ideas. Emphasize new concepts in bold.

– At each step, make a pause for students to think and say or write their ideas.

– A break or a song!

Teacher: After observing the above diagram , request learners to answer the above questions.

Students: observe and answer the questions above

Guide them on naïve ideas such as “a well balanced diet causes coronary diseases, medical check -up is allowed for sick people only”

Learning Activity 4:

Mentioning the coronary heart disease causes.

Remember learners that heart rate can be affected by: age ,sex, health status ,poor diet ,lack of exercise

Request your learners to answer the following:

- How many heartbeats did you count in a minute when sited?
- What are the major causes of coronary heart disease?

Application Activity :

1. Nowadays,Ministry of Health sensitize people to do physical exercises and take a well balanced diet; what are the ideas behind?
2. Relate car free day with human circulatory system in terms of coronary heart diseases . How it does contributes to the healthy of our circulatory system?Do you see any relevance to mobilize others practise sports? what advise can you give to others?

– If possible , take records of their performance and verify the achievement of learning objectives.

– Help learners to relate what they have learnt to real life experience by discussing the given case study.

	<p>Summary /notes</p> <p>The benefits of exercise include lowering your risk for heart disease, keeps your weight down and lowers your risk for some types of cancer.</p> <p>A healthy diet can help reduce your risk of developing coronary heart disease and stop you losing the weight, reducing your risk of diabetes and high blood pressure.</p> <ol style="list-style-type: none"> 1. Coronary heart disease: is a group of diseases that includes sudden coronary death 2. Benefits of balanced diet and physical exercise: prevention of coronary heart disease 	
<p>3. Assessment and conclusion 5 min</p>	<p>Formative Assessment</p> <ol style="list-style-type: none"> 1. What activities can affect the heart rate? 2. what is a coronary heart disease? 3. Outline some coronary heart disease. 4. Answer by True or False <p>A healthy diet can help to reduce your risk of developing coronary heart disease and stop you losing the weight, reducing your risk of diabetes and high blood pressure.</p> <p>Learners 'answers:</p> <ol style="list-style-type: none"> 1. Exercises , smoking ,coronary heart diseases 2. This is a disease in which a waxy substance called plaque builds up inside the coronary artery. 	<p>– Provide opportunities for corrective feedback or positive feedback to students. If possible, take records of their performance after formative assessment and verify the achievement of learning objectives.</p>

3. Arteriosclerosis , Thrombosis , Atherosclerosis.

4. True

We are coming to the end of our lesson. As we conclude, let's review some of the key points that we learned about

The benefits of exercise include lowering your risk for heart disease, keeps your weight down and lowers your risk for some types of cancer.

A healthy diet can help reduce your risk of developing coronary heart disease and stop you losing the weight, reducing your risk of diabetes and high blood pressure.

3. Coronary heart disease: is a group of diseases that includes sudden coronary death.
4. Benefits of balanced diet and physical exercise: prevention of coronary heart disease.

Now I want to give you a homework assignment so that you try to apply some of what we have learned today.

1. The following is not the benefit of exercise:

- A . Lowering your risk for heart disease
- B. Keeps your weight down
- C. Lowers your risk for some types of cancer
- D. Allowing it to beat faster

2. What are the risk factors for coronary heart disease?

Thank you for your participation in this lesson.

- Conclude the lesson by announcing the key subtitles and giving a homework to students.

LESSON FROM UNIT

9

Applications of anaerobic respiration

SUBJECT: Biology	Grade: S3	TIME: 40 minutes
LESSON: Cellular Respiration		
TEACHING AND LEARNING MATERIALS: charts, student book, Teachers' guide, textbooks,....		
SECTION/ STEPS	STEP –BY- STEP INSTRUCTIONS AND CONTENT	NOTICE TO THE TEACHER
1. INTRODUCTION (10 MIN)	<p>Teacher: Welcome to Biology lesson. I am sure you are going to enjoy today's lesson. Who can tell us the importance of respiration on human being?</p> <p>Students: Human being needs energy in form of ATP .</p> <p>Teacher: did you know how beer is prepared?</p> <p>Students: Yes , it is manufactured through a process of brewing.</p> <p>Teacher: Do you think that manufacturing beer needs oxygen?</p> <p>Students: no ,brewing does not requires oxygen</p> <p>Teacher: What do you think we are going to learn?</p> <p>Students: We are going to learn Applications of aerobic respiration</p> <p>Teacher:The lesson of today is: Applications of anaerobic respiration</p>	<ul style="list-style-type: none"> – Organize each of the items listed logically. – Announce the title of the lesson. – Connect the learners' expectations with learning objectives – Give learners opportunity to reflect on the introductory questions.

This lesson will allow you to attain the following objectives:

- Discuss with the whole class about the applications of anaerobic respiration
- Describe the role of anaerobic respiration in yeast during brewing and baking
- Appreciate the role of anaerobic respiration
- Introduce the lesson by displaying the chart below:



Teacher: Request students to observe the above diagram and answer to the following questions

Students: Observe the above diagram and answer to the questions

Ask your students to pair up and give them time to discuss on how milk is fermented in order to provide key question

- What are the applications of anaerobic respiration?

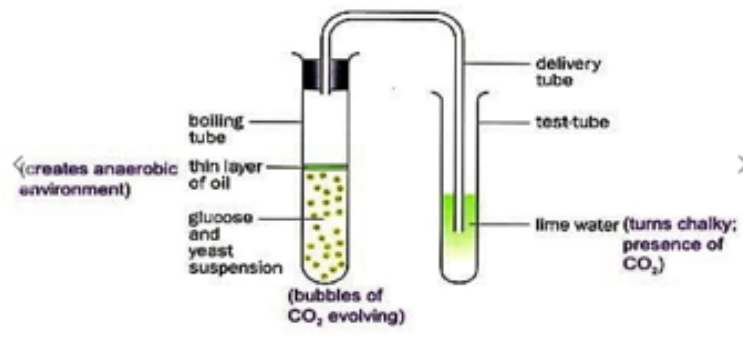
– Allow learners to ask question about the topic of the day.

– Build on their questions and communicate the key questions

2.
LESSON
DEVELOPMENT
(25 MIN)

Display the chart showing beer manufacture and ask learners to observe carefully.

- **Anticipate student misconceptions:** “All organisms require oxygen in order to respire, the major application of anaerobic respiration is to produce young ones”.
- **Explain some key concepts such as:** brewing; chemical manufacture of beer, sewage treatment: plant leaves decay by bacteria.



After observing the wall chart, learners are suspected to answer in their group works the following questions:

- Discuss the role of yeast in brewing.
- Display the chart showing baking process, ask learners to explore and present their findings.

Application Activity

Using your anaerobic respiration knowledge, advise a farmer keeps how he/she can add the value to milk product.

- Pause to allow students to get their materials before moving on.
- Notes are read slowly to give students a chance to visualize.
- Provide resources to learners
- Give instructions to learners
- Ask learners to explore and record their findings
- Ask learners to present their findings
- Build on learners’ ideas to expand their knowledge

	<p>Summary /notes</p> <p>Applications of anaerobic respiration include:</p> <ul style="list-style-type: none"> • Bread baking • Sewage treatment plants • Brewing • Agriculture • Dairy industry • Production of Biogas. 	<ul style="list-style-type: none"> – Help learners to relate what they have learnt to real life experience by discussing the given case study
<p>3.ASSESSMENT AND CONCLUSION 5 MIN</p>	<p>Formative Assessment</p> <ol style="list-style-type: none"> 1. Choose the best statement to describe the roles of anaerobic respiration <ol style="list-style-type: none"> A. Bread brewing and baking B. Dairy industry and sewage treatment plants. C. In agriculture and production of biogas D. All above 2. What are the importance of anaerobic respiration? 3. What are the applications of anaerobic respiration? <p>Learner's Answers</p> <ol style="list-style-type: none"> 1. D 2. Manufacture of beer,used in dairy industry,used to treat sewage 3. Formation of biogas,used in agriculture 	<ul style="list-style-type: none"> – Assess learners basing on the key questions to verify the achievement of learning objectives. – Use the ideas given by learners during formative assessment, enrich their feedback to summarise the lesson. – If possible take records of their performance and verify the achievement of learning objectives.

Conclusion

Teacher: We are coming to the end of our lesson. We have mainly studied the applications of anaerobic respiration where some of them are bread baking , brewing ,production of biogas . Hope everyone has captured the key content of this lesson.

You will do the following homework to enhance your competences:

Homework:

1. What are the five different applications of anaerobic respiration?
2. Explain how fermentation process is used in baking

Thank you for your participation in this lesson ,see you next..

- Conclude the lesson by announcing the key subtitles and giving a homework to students.

LESSON FROM UNIT

10

Skin and homeostatic mechanisms

Subject: Biology	Grade: S3	DURATION: 40 minutes
<p>LESSON: Skin and homeostatic mechanisms</p> <p>TEACHING AND LEARNING MATERIALS: Charts showing the skin, textbooks, pamphlets, handouts about the kidney structure, photographs showing the kidney, flesh kidney from a dissected mammal,...</p>		
SECTION/ STEPS	STEP –BY- STEP INSTRUCTIONS AND CONTENT	NOTICE TO THE TEACHER
<p>1. Introduction (10 minutes)</p>	<p>Teacher: Welcome to Biology lesson. I am sure you are going to enjoy today's lesson. Who can tell us the importance of skin on human being?</p> <p>Student: Skin plays the role of protection for human being.</p> <p>Teacher: What is the part of the skin that detect coldness?</p> <p>Student: The the blood vessels</p> <p>Teacher: How the skin, blood vessels detect the coldness?</p> <p>Student: The hairs on the skin stand upright and the blood vessels dilate</p> <p>Teacher: What do you think we are going to learn?</p> <p>Students: We are going to learn skin and its functions</p>	<ul style="list-style-type: none"> – As you start a new lesson, begin by welcoming learners and gaining their attention. – Ask general questions to identify their prerequisites. – Announce the title of the unit and lesson.

Teacher: Yes, we start a new unit called Skin and homeostatic mechanisms. This unit will allow you to be able to explain homeostatic mechanisms and the role of the skin in temperature control.

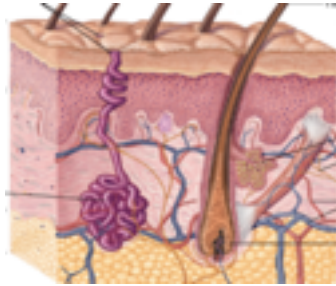
The lesson of today is "Skin and body temperature control."

Introductory Activity

Teacher: Normal temperature of the human body varies between 36.1 to 37.2 Celsius degree (°C). What does it mean when the temperature goes beyond the normal range?

Student: The body suffers from illness for example Covid-19.

Teacher: Display the chart showing the skin and request students to observe the chart and answer to the questions.



Teacher: What does the above diagram show?

Student: It shows the human skin.

Teacher: What does it happen to the skin and blood vessels when it is too cold or too hot?

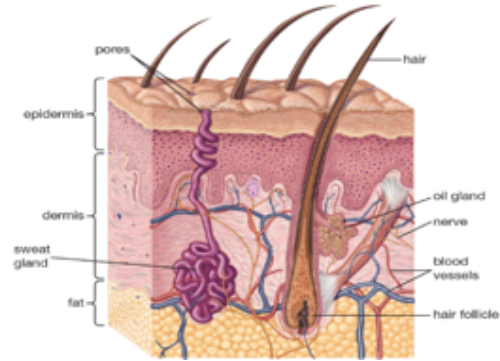
Hairs stand upright, blood vessels dilate if cold. When hot, hairs are smooth and blood vessels constrict.

- Connect the learners' expectations related to this lesson to the learning objectives
- Give learners opportunity to reflect on the introductory questions.
- Allow learners to ask questions about the topic of the day.
- Provide resources to learners
- Ask learners to explore and record their findings
- Ask learners to present their findings

2. Lesson Development (25 min)

Activity 1

Teacher: Display the labelled diagram of the human skin and ask learners to observe and answer to the questions.



Teacher: What does it happen to human body skin hairs and blood vessels when:

1. It is too cold (temperature decreases).
2. It is too hot or warm (temperature increases).

Student:

- i. When it is too cold, the body shivers, the hairs on the skin stand upright and the blood vessels in the skin constrict (decrease the size).
- ii. whereas if it is too hot, the body sweats more, hairs lying on the skin and the blood vessels in the skin dilate (increase in size).

Teacher: What are 3 physiological processes involved in regulation of temperature in animals?

Student: Vasodilatation, vasoconstriction and shivering.

- Ask learners to present their findings
- Build on learners' ideas to expand their knowledge
- Help learners to relate what they have learnt to real life experience.
- Provide an opportunity where students can ask questions where the teacher can help every learner depending on his/her special educational needs a
- Ask some questions leading students to summarize the lesson.

	<p>Teacher: What is the difference between vasodilatation and vasoconstriction? Student: Vasodilatation is a process by which blood vessels found in the skin decrease in size.</p> <p>Vasoconstriction is the process by which blood vessels found in the skin increase in size</p> <p>Application Activity</p> <ol style="list-style-type: none"> 1. Why does a sick person sweat? 2. What are home practices done to the person whose body temperature increases or decreases? <p>Summary /notes</p> <p>Human body is protected by the skin from cold or hot. When it is too cold, the body shivers, the hairs on the skin stand upright and the blood vessels in the skin constrict (decrease in size) whereas if it is too hot you will sweat more, hairs lying on the skin and the blood vessels in the skin dilate (increase in size).</p> <p>Animals use behavioral and physiological methods to regulate the body temperature. Regulation of temperature involves brain, skin, muscles and blood vessels. Vasodilatation is the process by which blood vessels found in the skin decrease in size while the vasoconstriction is the process by which blood vessels found in the skin increase in size.</p>	<ul style="list-style-type: none"> – Provide opportunities for corrective feedback or positive feedback to students. If possible, take records of their performance after formative assessment and verify the achievement of learning objectives.
<p>3. Assessment and Conclusion (5 min)</p>	<p>Formative Assessment</p> <p>Teacher: A crocodile's activity increases when the outside temperature rises. How would you classify this animal?</p> <ol style="list-style-type: none"> A) Ectoderm B) Endoderm 	<ul style="list-style-type: none"> – Conclude the lesson by announcing the key message and giving a homework.

2. Which one of the following is the reaction of the human skin when the body becomes very cold?
- A) The arterioles constrict, the hair stands on end and sweat production ceases.
 - B) The arterioles constrict, the hair lies flat on the skin and sweating occurs.
 - C) The arterioles dilate, the hair stands on end and sweat production almost ceases.
 - D) The arterioles dilate, the hair lies flat on the skin and sweating occur
3. Identify any two hormones used by the skin to control the body temperature.

Students' answers

- 1. B
- 2. C
- 3. ADH, NADH

Conclusion

Teacher: We are coming to the end of our lesson. We have mainly studied the meaning of how the skin protects us from coldness and hotness. Hope everyone has captured the key content of this lesson.

Homework

You will do the following homework to enhance your competences:

- 1. Name three physiological processes involved in regulation of temperature in humans. of the body's internal environment that need to be kept constant.
- 2. Explain why a sick person sweats during night.

Thank you for your participation, see you next.

- Conclude the lesson by announcing the key message and giving a homework.

LESSON FROM UNIT

11

Role of auxins in controlling shoot growth

SUBJECT: Biology	Grade: S3	TIME: 40 minutes
LESSON: Response and coordination in plants		
TEACHING AND LEARNING MATERIALS: Charts, manila papers, chalk board, chalk.		
SECTION/ STEPS	STEP –BY- STEP INSTRUCTIONS AND CONTENT	NOTICE TO THE TEACHER
1. INTRODUCTION (10 MIN)	<p>Teacher: Welcome to Biology lesson. I am sure you are going to enjoy today's lesson. Who can tell us the meaning of coordination?</p> <p>Student: Coordination is the mechanism whereby living organism give the correct response at correct time to particular stimulus.</p> <p>Teacher: Who can define tropism?</p> <p>Student: Tropism is a growth movement towards or away from stimulus.</p> <p>Teacher: Do you think there is a substance in plant that may be responsible of shoot growth?</p> <p>Student: Yes, there is a substance called auxin.</p> <p>Teacher: What do you think you are going to learn in this lesson today?</p> <p>Student: The role of auxin in controlling shoot growth?</p>	<ul style="list-style-type: none">– Start by gaining the students' attention and motivate them.– Give time learners to think on asked questions and allow them to provide their answers/ expectation.– Connect learners' expectations related to this lesson to the unit competences and lesson objectives.

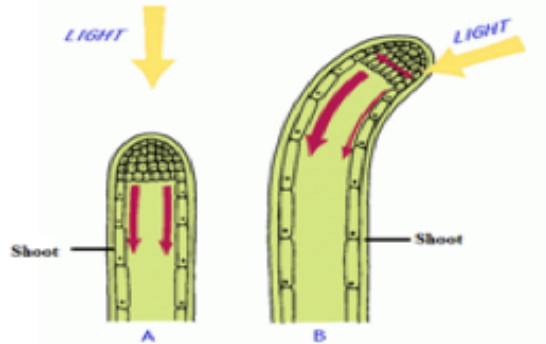
Teacher: Yes, good.

The lesson of today is: The role of auxins in controlling shoot growth

This lesson will allow you to attain the following objectives:

- Define auxins
- Explain role of auxin in controlling shoot system.
- Investigate through an experiment the response of plant shoot towards light and gravity.

Teacher: Observe the following chart. What do you see on that diagram?



Student: Growth of stem

Teacher: Why plant shoot A grows straightway?

Student: It grows straightway due to tip of shoot that produces plant growth regulator called auxin. Light that hits the tip of shoot allow auxin to move down in the same way and stimulate the growth of shoot A in the same ways.

- Announce the title and write it
- Give learners opportunity to reflect on the activities' questions.
- Allow learners to ask questions about the topic.
- Give learners opportunity to reflect on the introductory questions.
- Allow learners to ask questions on the topic of the day.

Teacher: Why plant shoot B bends toward the light?

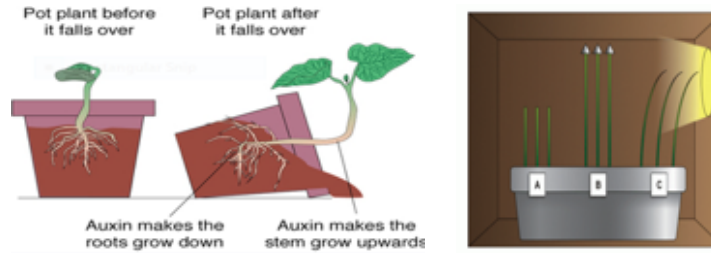
Student: The plant shoot B bends toward the light due to auxin produced by tip of shoot. It is affected by light from one side and move to the shaded side to cause more growth there, that result bending growth toward source of light.

- Build learners on their questions and communicate the key questions.

2. LESSON DEVELOPMENT
25 MIN

Learning Activity 1. Effect of auxins concentration on shoot and root during phototropism

Teacher: On the figure below, what is the substance controlling growth in plants?



Student: The substance that control growth in plants are plant hormones (auxins).

Teacher: Where those substances are located?

Student: Auxins are located in plants on the tips of shoots and roots.

Teacher: How does auxins influence growth?

Student: They influence growth by:

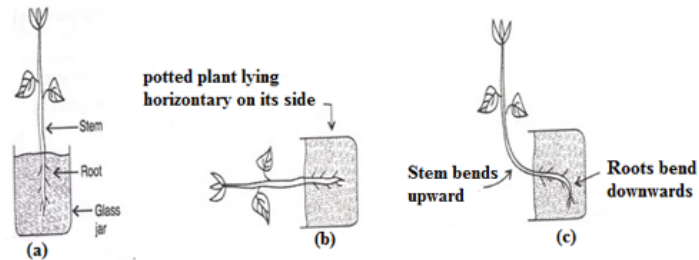
- Making the cell permeable to useful substances for growth.
- Increasing the metabolic rate of cells to produce more energy.
- Increasing the turgidity of cells.

- Students must be given time to think and note down their ideas.
- Use different questions to probe learners to understand the content.

Learning Activity 2: Effect of auxin and geotropism

Teacher: After your observation, answer the question in groups

1. What is the effects of auxins in geotropism?



Student Presentation:

- The auxin concentration in root or shoot causes growth in positive or negative geotropism in roots, the lower part that has a higher auxin concentration, the cells undergo less elongation, causing less growth.

The upper part has a lower auxin concentration and the cells elongate more. This causes growth more as results root grows curving downwards.

Learning activity 3: Use of auxin



- Keep guiding learners in every step.

Teacher:

1. On the picture above, two men are using sprayers to do what? What are the farmers spraying?
2. What do you think about the role of auxin? Which one?

Student: The farmers clean their garden by spraying synthetic auxin such as indol-3-acetic acid (IAA)

Teacher: What do you think about the role of auxin? which one?

Student:

- Auxins are used in high plant as selective weed killer or herbicide.
- Auxins stimulates a variety of growth and developmental processes when present at low concentration at the cellular sites of action.

However, with increasing concentration and auxin activity in tissue, growth is disturbed and the plant is lethally damaged.

High amount of auxin are used to control unwanted plants (weeds).

Application activity

Teacher: A nursery is a place where plant is propagated and grown to a desired age within a greenhouse or others. Give a reason why the green houses must have a transparent roof and walls?

Student: A greenhouse has transparent roof and walls to allow light to reach in all corner of plants.

Teacher: What will happen to the growth of seedling when they are kept in greenhouse with darkened roof and transparent walls?

Student: They grow and bend toward the transparent wall.

– Help learners to relate what they have learnt to real life experiences by discussing the given case study.

– Assess learners basing on the key question and verify the achievement of learning objectives.

Teacher: Which is the plant growth regulator that is used to control the growth of seedling in nurseries?

Student: A plant growth regulator is auxin.

Lesson summary

Shoot and root produce plant growth regulators or plant hormones called auxins in response to stimulus.

In geotropism auxin causes tip of root to grow downward in the soil.

In phototropism, auxins cause shoot of potted plant lying on its side to bend upward against gravity and shoot shaded plant to bend towards light sources. Auxin is used as weed killers.

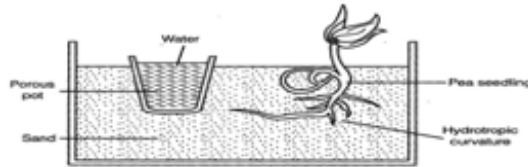
- If it is possible, take records of their performance and verify the achievement of learning objectives.

3. ASSESSMENT AND CONCLUSION

5 MIN

Assessment Questions

Teacher: Look at a figure below and answer the questions.



Plant roots respond positively to both water and gravity.

- a) Give a reason why the above experiment is showing hydrotropism instead of geotropism?

Student: It is hydrotropism because plant roots respond to water in porous pot.

Teacher: State the plant regulator that allows bending in tropic response

Student: Plant regulator is auxin.

Teacher: Choose the correct

Auxin promotes plant growth by:

- a. increasing the plasticity of plant cell walls.
- b. stimulating uptake of water by seeds.
- c. causing elongation of stems.
- d. increasing the rate of photosynthesis.

Student: Answer is c

Conclusion

We are coming to the end of our lesson, we have mainly studied the role of auxin. Concentration on growth at shoots and roots for phototropism and geotropism and uses of auxin. I hope you have got the key content of this lesson. You will do the following homework to enhance your competence.

Homework

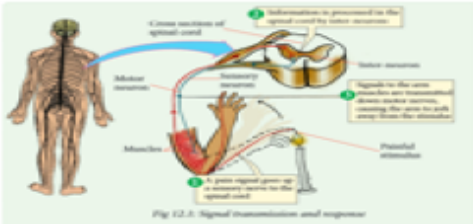
Explain how auxin hormone control plant growth?

Thank you for your participation in this lesson.

LESSON FROM UNIT

12

Need for co-ordination and response in animals

Subject: Biology	Grade: S3	DURATION: 40 minutes
<p>LESSON: Response and co-ordination in animals</p> <p>TEACHING AND LEARNING MATERIALS: manila paper, chalk, chalkboard, student' book, chart.</p>		
SECTION/ STEPS	STEP -BY- STEP INSTRUCTIONS AND CONTENT	NOTICE TO THE TEACHER
<p>1. Introduction (10 minutes)</p>	<p>Teacher: Welcome to Biology lesson. I am sure you are going to enjoy today's lesson.</p> <p>Observe well the picture and answer the question. What is sensitivity?</p>  <p>Student: It is ability of organism to sense or detect changes in the environment and respond to them.</p> <p>Teacher: What do you think you are going to learn?</p> <p>Student: We are going to learn the coordination in animals.</p>	<ul style="list-style-type: none"> – Start by gaining learners' attention and motivating them. – Give time learners to think on asked questions and allow them to provide their answers – Connect the learners expectations related to this lesson to the key unit competence and objectives – Give learners opportunity to reflect on the activities' questions

The key unit competence of this unit is “to be able to relate structures of nervous and endocrine systems to their function”.

The lesson of today is: The coordination and response in human being animals

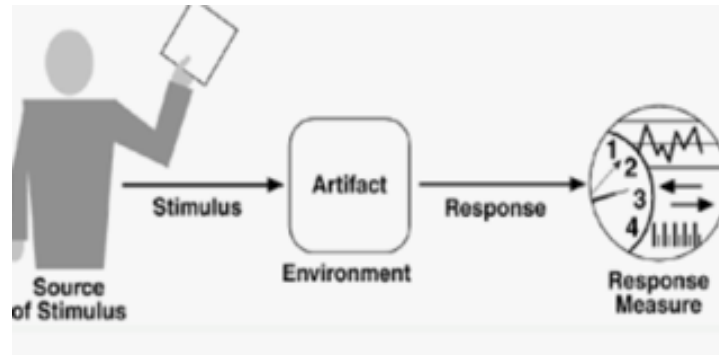
The lesson will allow you to attain the following objectives:

- To define coordination
- To state the components of coordinated behaviour in an organism.
- To appreciate importance of coordination in humans

Introductory Activity

Teacher: Look at a figure and answer the question:

- How do organisms detect and respond to changes in their environment?



Student: Organisms detect and respond to the change in environment by coordination.

- Allow learners to ask questions about the topic of the day.
- Announce and write the unit title.
- Communicate the key unit competence.
- Announce and write the lesson title
- Communicate the lesson objectives.
- Learners must be given time to think and note down their ideas.

2. Lesson Development

25 min

Learning Activity 1

Teacher : In your groups, observe the picture and interpret the story in the situation given and answer the following questions:



1. What does provoke the kid to rush?
2. How does the kids respond to the action which pushed to rush?
3. What are the components involved in coordination?
4. Why is coordination necessary in human?
5. What is coordination?

Student's Presentation

- 1) A heavy bag.
- 2) A kid run.
- 3) The components are: stimulus, receptor, coordinator response and effector.
- 4) Because it helps organism to adapt ,to change and increase their chance of survival
- 5) **Coordination:** is a process whereby a living organism give the correct response at the correct time to a particular stimulus

- At each step, make a pause for students to think and say or write their ideas.
- Ask learners to explore and record their observations.
- Allow learners to present their answers.
- Build on learners ideas to expend their knowledge.

Learning Activity 2

Teacher: A student is going to school but he is late, he is rushing to the bus while complaining about his heavy bag. What are all organs which are working together to allow the student to see the bus?

Student: The organs working together are: Eye, Skin, Brain, Ear.

Teacher: Among listed organs, which one controls others?

Student: The organ that controls others is the Brain

Teacher: What are the components of coordination?

Student: The components of coordination are: stimulus, receptor, coordinator, response and effector.

Application Activity:

Teacher: Suppose you are a hospital vehicle driver. Your duties are to transport patients and stuffs where you are asked to go. Explain why it is forbidden to receive a phone call while driving?

Student: Because the brain can coordinate the two activities of driving and responding to the phone call in different manner which may lead to the road accident.

Teacher: Take a hot object, what do you feel?

Student: You feel hotness and painful.

Lesson Summary

Coordination is a process whereby different organs work together for a goal or effect. In biology, coordination is the process whereby a living organism gives the correct response to a stimulus. Coordination allows adaptation and chance to survive. Components of coordination include: Stimulus, receptor, brain, effector and response and spinal cord. In animals, coordination is performed by the nervous system and the endocrine system.

- Help learners to relate what they have learnt to real life experiences through discussion.
- Provide opportunities for learners to ask questions
- Teacher orients the learner's answers.

**3. Assessment
and conclusion
5 min**

Assessment Questions

Teacher: What is coordination?

Student: Co-ordination is the process whereby a living organism gives the correct response at the correct time to a particular stimulus.

Teacher: Identify the components of a coordinated behaviour

Student: The components of coordination are: Stimulus , Receptor, Coordinator, effector and Response

Teacher: Why is coordination necessary in animals?

Student: Coordination is necessary because it helps organism to adapt, to change and increase their chance of survival.

Conclusion

We are coming to the end of our lesson, we have mainly studied the meaning of coordination and the component of coordinated behavior in animal. Hope everyone has captured the key content of this lesson.

You will do the following homework to enhance your competence.

Homework

Draw a pathway of coordination process in animals

Thank you for your participation, see next

- Assess learners basing on the key questions to verify the achievement of learning objectives.
- Verify achievement of learning objectives.

LESSON FROM UNIT

13

Mode of Asexual Reproduction

SUBJECT: Biology	Grade: S3	TIME: 40 minutes
LESSON: Asexual and Sexual Reproduction		
TEACHING AND LEARNING MATERIALS: Chart, Manila Paper, Chalkboard, etc.		
SECTION/ STEPS	STEP –BY- STEP INSTRUCTIONS AND CONTENT	NOTICE TO THE TEACHER
1. INTRODUCTION (10 MIN)	<p>Teacher: Welcome to Biology lesson. I am sure you are going to enjoy today's lesson. How organisms increasing their individuals?</p> <p>Student: They can increase individuals through reproduction process.</p> <p>Teacher: What is reproduction?</p> <p>Student: Reproduction is a process by which living organisms give rise to new individuals of the same kind.</p> <p>Teacher: Do all living have the same reproduction process? Why?</p> <p>Student: No. Because some reproduce sexually but other reproduce asexually.</p> <p>Teacher: What do you think we are going to learn?</p> <p>Student: We are going to learn "Modes of asexual reproduction"</p> <p>Teacher: Yes, we start a new unit called "Asexual and sexual reproduction"</p>	<ul style="list-style-type: none"> – Start by gaining learners' attention and motivating them. – Give time learners to think on asked questions and allow them to provide their answers/ expectations. – Give learners opportunity to reflect on the activities' questions.

The key unit competence of this unit is “to be able to distinguish sexual and asexual reproduction giving the advantages and disadvantages of each”.

The lesson of today is: Mode of asexual reproduction

This lesson will allow you to attain the following objectives:

- Define asexual reproduction.
- Identify mode of asexual reproduction in organisms

Introductory activity

Teacher: Observe the following chart. What do you see on that figure?



Student: This figure represent reproduction of amoeba.

Teacher: When the cow is in heated period, it needs the bull or veterinary to inseminate it for reproduction. When amoebas multiply, they do not need the males and females amoeba to increase their individual.

How do you think the amoebas have been increased in number?

Student: Amoeba increases in number by reproducing asexually.

– Allow learners to ask questions about the topic of the day.

– Announce and write the unit title. Communicate the key unit competence.

– Announce and write the lesson title

2. LESSON DEVELOPMENT (25 MIN)

Learning activity 1

Teacher: Observe the figure displayed. These living things reproduce asexually. **What is asexual reproduction?**



Student: Asexual reproduction is the type of reproduction which does not involve the union of the sex cells. Also is a reproduction whereby one organism gives rise to identical offspring.

Learning activity 2

Teacher: In your groups, discuss about different modes of asexual reproduction in organism?



Students Presentation

Different modes of asexual reproduction in organism include:

1. Binary fission
2. Sporulation
3. Budding
4. Fragmentation
5. Vegetative propagation

Application activity

Teacher: Suppose you are an agronomist in one of the sectors of the district. You are tasked to increase food production in the sector. You are requested to advise farmers to increase production without using mineral fertilizers. What advice could you provide to the farmers in order to get fertilizers?

- Communicate the lesson objectives.
- Give learners opportunity to reflect on the activities' questions.
- Help learners to relate what they have learnt to real life experience by discussing the given case study.

Teacher: How does bananas in your environment reproduce?

Student: Bananas reproduce asexually.

Summary Of Lesson

Asexual reproduction is a reproduction which involves only one parent to produce offspring.

The modes of asexual reproduction are; binary fission and multiple fission, budding, spore formation, fragmentation, regeneration and vegetative propagation in plants.

Asexual reproduction brings forth many new individuals that are genetically identical.

- Assess learners basing on the key questions to verify the achievement of learning objectives.

3. ASSESSMENT AND CONCLUSION

5 MIN

Assessment Questions

Teacher: Make groups of 5 students and discuss about the questions below:

X. choose the best answers

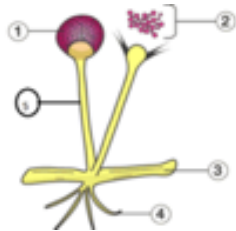
1. Which of the following structure is not involved in vegetative reproduction?

- a) Fruit b) Stolon c) Bulb d) Corm

2. What type of asexual reproduction found in amoeba?

- a) Binary fission b) budding c) Fragmentation d) Vegetative propagation

Y. The figure below shows a fungus. **Observe it and answers the questions.**



- a) Name the labelled 1, 2, 3, 4, 5.
 - b) According to your analysis, specify the mode of asexual reproduction used by fungus.
- Z. State the parts used by a plant in vegetative reproduction.

Students Presentation

- 1. is A: **fruit**
 - 2. is A: **binary fission**
- Y. **a)** 1= is a sporangium 2 = is a spore 3 = is a hyphe 4 = is rhizoids 5 = is sporangiophore
- b)** Fungi reproduce by sporulation
- Z. The parts of plant involved in vegetative reproduction are: root, stem and leaves.

Conclusion


Teacher: We are coming to the end of our lesson. We have mainly studied the definition of asexual reproduction and different mode of asexual reproduction. Hope everyone has captured the key content of this lesson. You will do the following homework to enhance your competences:

Homework

Draw a diagram of reproduction in amoeba and showing mode of reproduction

Thank you for your participation, see you next.

Structure of a flower

Subject: Biology	Grade: S3	DURATION: 40 minutes
LESSON: Sexual Reproduction in Flowering Plants TEACHING AND LEARNING MATERIALS: Hibiscus flower, chart, chalkboard, chalk, student book		
SECTION/ STEPS	STEP –BY- STEP INSTRUCTIONS AND CONTENT	NOTICE TO THE TEACHER
1. Introduction (10 minutes)	<p>Teacher: Welcome to biology lesson. I am sure that you are ready to enjoy today's lesson. What do you see on this diagram?</p>  <p>Student: The diagram shows the life cycle of flower.</p> <p>Teacher: What do you think we are going to learn in this unit?</p> <p>Student: We are going to learn the structure of flower</p>	<ul style="list-style-type: none"> – Start by gaining learners' attention and motivate them. – Give time learners to think on asked questions and allow them to provide their answers – Connect the learners expectations related to this lesson to the key unit competence and lesson objectives.

The key unit competence of this unit is 'to be able to explain how sexual reproduction occur in flowering plants'

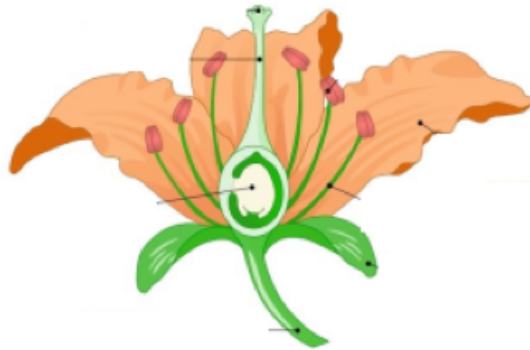
The lesson of today is" The structure of flower"

This lesson will allow you to attain the following objectives:

- Draw a well labelled diagram of flower and identify its parts.
- Describe the structure of stamen and carpel
- Appreciate the function of the different structures of a flower.

Introductory Activity

Teacher: Observe the following chart. What do you see on this figure?



Student: We see different parts of flower.

Teacher: What do you think are the main parts of a flower?

Student: I think that the main parts of flower are: Sepal, Petal, Stamen and Carpel.

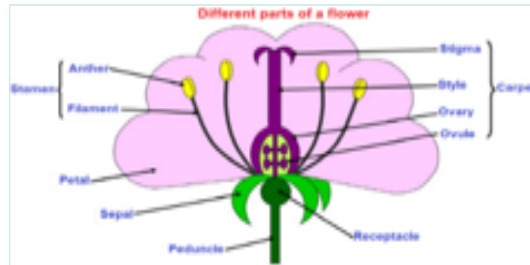
- Give learners opportunity to reflect on the activities' questions.
- Announce and write the unit title. Communicate the key unit competence.
- Announce and write the lesson title
- Communicate the lesson objectives
- Allow learners to ask questions about topic of the day.
- Build on their questions and communicate the key questions.
- Learners must be given time to think and note down their ideas.

2. Lesson Development

25min

Learning activity 1

Teacher: Observe the figure below and answer questions in your group



Student Presentation

1. What are the main parts of a flower?
2. Why are some flowers called complete flowers?
3. The main parts are sepals, petals, stamens and carpels
4. Because they bear both males and females parts

Learning Activity 2.

Teacher: Observe carefully the above figure in activity 1 and into group of 4 students, discuss the structure of: **a)** pistil **b)** stamen

Students Presentation

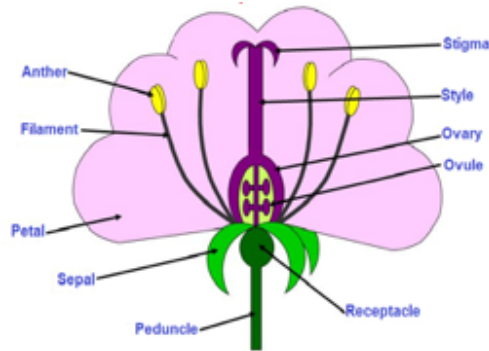
A Stamen is composed of: Anther and Filament

A Pistil is composed of: Stigma, Style and Ovary

Learning Activity 3.

Teacher: In your groups discuss about the function of flower parts?

- Use different questions to probe learners understanding the content.
- Ask learners to present their findings
- Build on learner's ideas to expand their knowledge



Students Presentation:

The functions of the following parts are:

- **Sepal:** It protects the flower when in bud
- **Petal:** It attracts pollinators
- **Anthers:** They produce pollen grain
- **Stigma:** It receives pollen grain during pollination
- **Ovary:** It protects ovule.
- **Ovule:** It develops into seeds
- **Filament:** It supports anthers

Application Activity

Teacher: Suppose you are a gardener and you are interested in plants multiplication. which parts of flower do you think are more concerned with sexual reproduction?

Student: The parts of plant that involve in sexual reproduction are stamens and carpels

- Help learners to relate what they have learnt to critical life experience by discussing the given case study.
- Use questions to summarise the lesson.

Teacher. After visiting your school garden collect hibiscus flower, in your notebooks, draw a well labelled diagram of hibiscus flower.

Student: we are ready to do it.

Lesson Summary

The male part of the flower is called stamen. Each stamen is composed of anther and filament

The Anther produces pollens.

The female part of the flower is called pistil (carpel) and is composed of stigma, style and ovary. The stigma receives pollen during pollination. The ovary contains and protect the ovules.

Petals – brightly colored parts, which attract pollinators

Sepal – Outer covering parts which protects the flower when in bud.

Peduncle – Stalk of the flower.

– Assessing learners basing on the key questions to verify achievement of learning objectives.

– If possible, take records of their performance and verify achievement of learning objectives.

3. Assessment and conclusion

5 min

Assessment Questions

Teacher: What is a flower?

Student: Flower is reproductive part of plant

Teacher: Name the part of the flower labelled A-J.



Student: A: Anther, B: Filament, C: Petal, D: Sepal E: ovule, F: Stalk, G: Stigma, H: Style, I: Ovary, J: Receptacle

Teacher: What are the function of the following floral parts:

a) anther b) ovary c) petal d) sepal e) stigma?

Student:

- **Anther:** It produces pollen grain.
- **Ovary:** It protects ovule.
- **Petal:** It attracts pollinators.
- **Sepal:** It protects developing flower inside the bud.
- **Stigma:** It receives pollen grain during pollination.

Conclusion

Teacher: We are coming to the end of our lesson. We have mainly studied the Structure of flower, the part of flower and their functions. Hope everyone has captured the key content of this lesson.

You will do the following homework to enhance your competences:

Homework

Draw a labelled diagram of flower and enumerate the functions of each part.

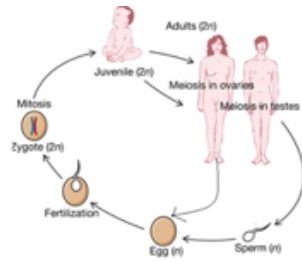
Thank you for your participation, see you next.

LESSON FROM UNIT

15

Fertilization and Implantation

Subject: Biology	Grade: S3	DURATION: 40 minutes
<p>LESSON: Structure of a flower</p> <p>TEACHING AND LEARNING MATERIALS: Hibiscus flower, chart, chalkboard, chalk, student book</p>		
SECTION/ STEPS	STEP –BY- STEP INSTRUCTIONS AND CONTENT	NOTICE TO THE TEACHER
<p>1. Introduction (10 minutes)</p>	<p>Teacher: Welcome to Biology lesson. I am sure you are going to enjoy today's lesson. Who can answer this question?</p> <ul style="list-style-type: none"> – What do we call secondary sexual characteristics in human? <p>Student: These are features that develops during the puberty age that differentiate male and female.</p> <p>Teacher: State two sexual hormones in human body.</p> <p>Student: -Follicle stimulating hormones (FSH) in female and Interstitial cell stimulating hormone (ICSH) in male.</p> <p>Teacher: Observe carefully the displayed image then after answer the questions:</p>	<ul style="list-style-type: none"> – Begin by gaining students' attention and readiness. – Ask general questions on the last lesson. – Give time learners to think on asked questions and allow them to provide their answers/ expectations.



What do you see on the image and what do you think we are going to learn in this unit?

Student: There is a cycle for reproduction. We are going to learn Fertilization and implantation (formation of new individual).

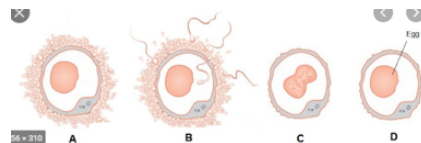
Teacher: Yes, the lesson of today is: Fertilization and implantation

The lesson will allow you to attain the following objectives:

- Explain the process of fertilization and implantation.
- Describe the pathway of fertilization.
- State the functions of placenta.

Introductory activity

Teacher: Observe the diagrams displayed then after answer the questions:



1. What do you observe on the diagram?
2. In which system can you find this process?
3. Try to differentiate these process from A to D

- Help learners to observe the image and answer the questions
- Connect the learners' expectations related to this lesson and lesson objectives.
- Ask learners the lesson title.
- If learners do not announce the lesson title, announce and write them on the chalkboard.

Student's Presentation

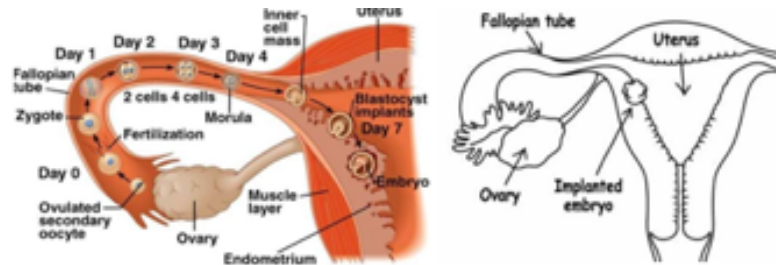
1. On the diagram there is male and female gametes (ovum and sperm)
2. It is found in reproductive system of human being.
3. A. Ovum becomes mature and be released out.
B. As the sperms reach near the ovum only one sperm enters the ovum the others remain out.
C. The zygote formed start to divide by mitosis division
D. The egg formed continue to divide through mitosis

2. Lesson Development (60 min)

Teacher: Differentiate the process of fertilization and implantation

Student: Fertilization is the process by which male gamete fuses with female gametes to form a zygote.

Implantation occurs when the zygote formed reach the uterus and start to divide through mitosis division. This cell division is called blastocyst.



After learners will present their findings.

Teacher: Describe the pathway of fertilization up to implantation

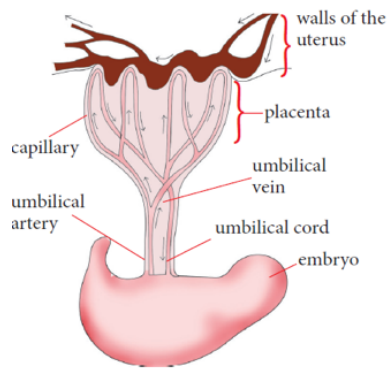
- Communicate the lesson objectives.
- Allow learners to ask questions about the topic of the day.
- Motivate them and raise their interest in following carefully the lesson such that they can answer the key questions related to how fertilization occurs in the body.
- Check before the pictures to be given to students.
- Tell learners that they are going to observe the picture.
- Ask a learner to present their findings/answers.

Student: Fertilization takes place in the oviduct when the ovum become mature be released out of the ovary then be retain by funnel of oviduct to the oviduct, the zygote form migrates toward the uterus for implantation.

After implantation one part of the blastocyst develops into the embryo while the outer layer of the blastocyst develop into 3 membranes: chorionic, allantois and amnion.

Amnion is a sac that develops from the embryo and envelops. It becomes filled with the amniotic fluid.

Teacher: Observe the displayed chart and explain the structure and main role of placenta.



Structure of placenta

Student: The placenta is made up of tissues and large number blood vessels. It has disc like shape the capillaries in the placenta unit to form a vein and two arteries which run in the umbilical cord from the placenta to the abdomen of the fetal. Role of placenta: placenta contains membrane that allow oxygen, water, amino acids, mineral salts to diffuse from the mother to the fetal. Placenta also protect the fetal from chock and injury.

- Ask learners to explain the pathway of fertilization and implantation.
- If the one fails, ask another to continue.
- Note on the chalkboard what the learner present.
- Always emphasize new concepts.
- Build on learners' ideas to expand their knowledge.
- After each activity, remember to put an energizer/warm up to capture learners' attention.
- Guide them to discuss on the functions of placenta.

Application Activity

Teacher: Is it necessary to have fertilization for living organism? Explain.

Student: Yes, when there is no fertilization living organism may disappear.

Teacher: Why pregnant women are not advised to take alcohol and drugs?

Student: Alcohol and drugs penetrate through the placenta to the baby and harm the baby.

Teacher: Some of females with unwanted pregnancy plan voluntary abortion either after fertilization or after implantation as they believe that life start after birth. After studying the course about fertilization and implantation can you encourage them to practice abortion as it is not to kill .Why?

Student: No, life start after fertilization.

Lesson Summary

Fertilization is the process by which male gamete fuses with female gametes to form a zygote.

Implantation occurs when the zygote formed reaches the uterus and start to divide through mitosis division. This cell division is called blastocyst.

Fertilization takes place in the oviduct when the ovum become mature be released out of the ovary then be retain by funnel of oviduct to the oviduct, the zygote form migrates toward the uterus for implantation.

After implantation one part of the blastocyst develops into the embryo while the outer layer of the blastocyst develops into 3 membranes: chorionic, allantois and amnion.

- The application activity helps learners to relate what they have learnt to real life experience
- Help every learner depending on his/her special educational needs,
- Provide opportunities for students to ask questions.
- Ask some probing questions leading students to summarize the lesson learnt.
- If possible, take records of their performance after formative assessment and verify the achievement of learning objectives.

Amnion is a sac that develops from the embryo and envelops. It becomes filled with the amniotic fluid.

The placenta is made up of tissues and large number blood vessels. It has disc like shape the capillaries in the placenta unit to form a vein and two arteries which run in the umbilical cord from the placenta to the abdomen of the fetal. Role of placenta: placenta contains membrane that allow oxygen, water, amino acids, mineral salts to diffuse from the mother to the fetal.

**3. Assessment
& Conclusion
(10 min)**

Assessment Questions

Teacher: Give the difference between fertilization and implantation.

Student: Fertilization is the fusion of male and female to form a zygote while implantation is the settle of zygote in the uterus.

Teacher: Where does fertilization take place?

Student: In oviduct/ fallopian tube.

Conclusion

Teacher: We are coming to the end of our lesson. We have mainly studied the fertilization and implantation, pathway of fertilization and implantation, structure and function of placenta. Hope everyone has captured the key content of this lesson.

You will do the following homework to enhance your competences:

Homework

1. Explain the process of fertilization
2. Explain the role of placenta

Thank you for your participation in this lesson.

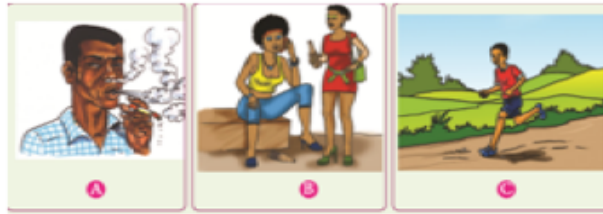
- Conclude the lesson by announcing the key subtitles and giving a homework to students.

LESSON FROM UNIT

16

Drugs

Subject: Biology	Grade: S3	DURATION: 40 minutes
LESSON: Factors that affect good health		
TEACHING AND LEARNING MATERIALS: Figures, Alcohol , Tobacco , Antibiotics,		
SECTION/ STEPS	STEP –BY- STEP INSTRUCTIONS AND CONTENT	NOTICE TO THE TEACHER
1. Introduction (10 minutes)	<p>Teacher: Welcome to BIOLOGY lesson. I am sure you are going to enjoy today's lesson.</p> <p>I start by asking you questions and you have to answer them correctly.</p> <p>What are the functions of public health services?</p> <p>Student: The functions of public health services are:</p> <ul style="list-style-type: none"> – Promote good health habits within the community – Prevent and reduce chronic diseases and injuries – Prevent public and environmental hazards <p>Teacher: State the organization of public health services</p> <p>Student: Public health services are organized as follow:</p> <ul style="list-style-type: none"> – Public health agencies – Public safety body – Health care providers 	<ul style="list-style-type: none"> – Start by welcoming the learners to the lesson. – Get students' attention and readiness – Ask questions for review and give time for answering – Ask learners to carefully observe the figure – Allow them to observe and give the answers – Ask learners the title of the lesson.



Student: On the figure A, the person is smoking. On B, two ladies are drinking alcohols on road. On C, the young man is doing sport.

Teacher: What do you think we are going to learn in this lesson?

Student: We are going to learn drugs and their effects

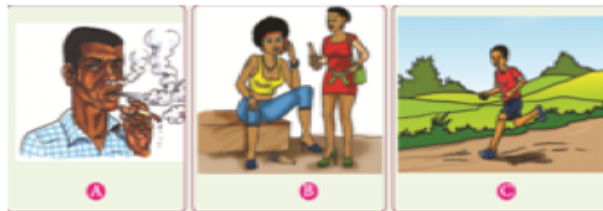
Teacher: Yes, the lesson of today is “Drugs”. We will discuss much in details in drugs.

This lesson will allow you to attain the following objectives:

- State the types of drugs.
- Explain effects of drugs.

Introductory Activity

Teacher: Observe again the figures. Discuss on the causes of such behaviors.



- If learners are not able to announce, teacher announce it and write it on the chalk board.
- Allow learners to ask questions
- Connect learners’ expectations with the lesson objectives
- Provide learners the time for observing and thinking on the questions and give their answers.

	<p>Student: These behaviors may be caused by:</p> <ul style="list-style-type: none"> – Lack of education – Lack of families – Wrong information – Lack of self-confidence <p>Teacher: Do you know some drugs in your community? What are bad behaviors manifested by drugs takers?</p> <p>Student: Yes, some drugs are tobacco, locally made beers with excess alcohol, etc. Drugs takers disturb the community, conflict between them, violence, etc.</p>	<ul style="list-style-type: none"> – Guide learners in their group discussion and encourage them.
<p>2. Lesson Development (25 min)</p>	<p>Learning Activity</p> <p>Teacher: Answer the following questions in your groups and present your answers</p> <ol style="list-style-type: none"> 1. What is the meaning of drugs and drugs abuse? 2. What are the types of drugs? 3. Discuss the effects of drugs on living organisms. <p>Students' presentation:</p> <ol style="list-style-type: none"> 1. Drugs are substances that influence the physiological processes and affect normal body functions when taken. Taking too much drugs is called drug abuse. 2. The types of drugs include alcohol, tobacco and marijuana. 	<ul style="list-style-type: none"> – Provide them the opportunities for thinking and discussing on the questions. – Allow them to present their answers – Guide learners to relate the lesson with real life experiences

3. Effects of:

- **ALCOHOL;** Drinking too much alcohol affects many parts of the body. It affects organs that metabolizes alcohol and other harmful substances.
- **TOBACCO:** Cigarette contains nicotine, tar and carbon monoxide. Each of this damage body cells
- **MARIJUANA:** It contains chemical compound including cannabinoids that produce a variety of effects in the body.

Application activity

Teacher: Answer the following questions:

1. Identify socio-economic problems associated with drug abuse.
2. Why cigarette are danger to human life but continues to persist on the market?

Students' presentation

1. Socio-economic problems associated with drug abuse include:
 - Decrease the economy of drug takers and the country
 - Cause conflict and poverty in families
 - No respect for individual use drugs
 - Intervene in sexually transmitted diseases
 - Increase of bandits
2. Cigarettes persist on the market because they are source of incomes to the economy of country through taxes and those countries protect their tobacco industries in different ways.

- Use probing questions and students answers to summarize the lesson.

	<p>Lesson summary</p> <p>Drugs are substances that influence the physiological processes and affect normal body functions when taken.</p> <p>Types of drugs include alcohol, tobacco and marijuana.</p> <p>Effects of drugs: ALCOHOL; Drinking too much alcohol affects many parts of the body. IT affects organs that metabolizes alcohol and other harmful substances.</p> <p>TOBACCO: Cigarette contains nicotine, tar and carbon monoxide. Each of this damage body cells</p> <p>MARIJUANA: It contains chemical compound including cannabinoids that produce a variety of effects in the body.</p> <p>Social problems associated with drugs: –decrease the economy of the drugs takers and country</p> <ul style="list-style-type: none"> – Cause conflict and poverty in families – No respect for individual use drugs – Intervene in sexually transmitted diseases. – Increase of bandits 	<ul style="list-style-type: none"> – Assess learners based on the key question to verify the achievement of learning objectives. – Provide opportunities for corrective feedback – Conclude the lesson – Give homework
<p>3. Assessment and Conclusion</p>	<p>Assessment</p> <p>Teacher: State some types of drugs</p> <p>Student: Alcohol, cigarette and marijuana.</p> <p>Teacher: Discuss on the effects of drugs</p> <p>Student:</p> <ul style="list-style-type: none"> – Too much alcohol affects many parts of the body. 	

- Cigarette contains nicotine, tar and carbon monoxide that harm body cells and organs
- Marijuana contains chemical compound including cannabinoids that produce a variety of effects in the body.

Conclusion

Teacher: We are coming to the end of our lesson. We have mainly studied the meaning of drugs, the types of drugs, the effects of drugs and problems associated with drugs.

As we finish our lesson write the home work and do it during your free time.

1. Explain the effects of using too much alcohol.
2. Research on other types of drugs.

Thank you for your participation in this lesson, see you next time.

LESSON FROM UNIT

17

Strategies for dual protection against both unplanned pregnancies and STIs, including HIV

Subject: Biology	Grade: S3	DURATION: 40 minutes
LESSON: Decision making regarding sexual relationships		
TEACHING AND LEARNING MATERIALS: condoms, norplant, pills, books		
SECTION/ STEPS	STEP –BY- STEP INSTRUCTIONS AND CONTENT	NOTICE TO THE TEACHER
1. Introduction (10 minutes)	<p>Teacher: Welcome to Biology lesson. I am sure you are going to enjoy today's lesson. Before we start a new lesson, answer the following questions:</p> <p>What are the factors that may lead people to practice of unsafe sex?</p> <p>Student: Peer pressure, alcohol and drug abuse, misleading information, practice of sex for financial gain, ignorance.</p> <p>Teacher: What is safe sex?</p> <p>Student: Safe sex is a sexual activity by people who have taken precautions to protect themselves against sexually transmitted infections (STIs) such as HIV/AIDS.</p> <p>Teacher: Are there any means to have safe sex?</p> <p>Student: Yes, by using condoms and others.</p>	<ul style="list-style-type: none"> – Begin by gaining students' attention and readiness. – Ask questions on the last lesson – Give time learners to think on asked questions and allow them to provide their answers/ expectations

Teacher: What do you think we are going to learn in this lesson?

Student: We are going to learn methods used to prevent unwanted pregnancies, STIs and HIV.

Teacher: Are there any means to have safe sex?

Student: Yes, by using condoms and others.

Teacher: What do you think we are going to learn in this lesson?

Student: We are going to learn methods used to prevent unwanted pregnancies, STIs and HIV.

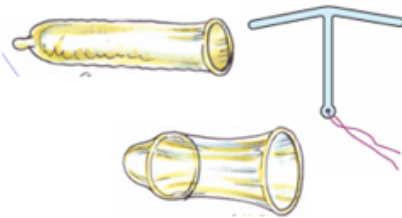
Teacher: Yes, the today's lesson title is Strategies for dual protection against both unplanned pregnancies and STIs, including HIV.

This lesson will allow you to achieve the following objectives:

- state all measures for dual protection against both unplanned pregnancies, STIs and HIV
- explain all measures for dual protection against both unplanned pregnancies, STIs and HIV

Introductory Activity

Teacher: Carefully observe the displayed image then answer the questions.



Teacher: What are these and what are used for?

- Display the image to the learners and give them opportunity to reflect on the introductory questions.
- Allow learners to ask question about the topic of the day.
- Build on their questions and communicate the key questions
- Give them the opportunity for thinking and provide the answers.

Student: These are male condom, female condom and IUD. They are used during sex to prevent sexually transmitted infections and unplanned pregnancies.

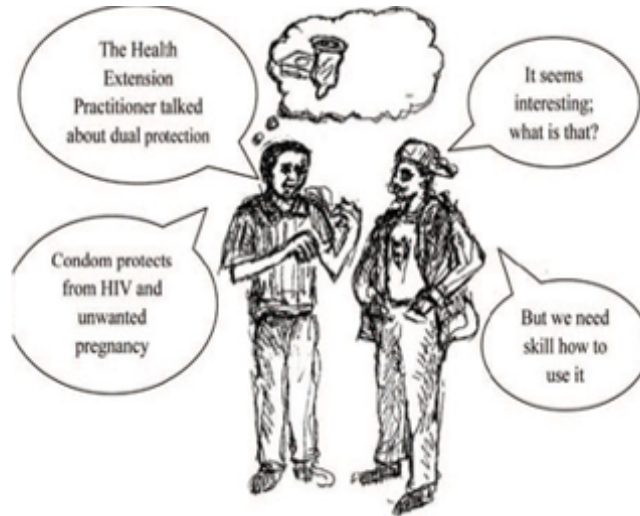
Teacher: What do we call protecting unplanned pregnancies?

Student: Protecting from unplanned pregnancies means to avoid unwanted birth or unplanned birth process. when individual is not able or doesn't want to give birth.

2. Lesson Development (60 min)

Activity 1.

Teacher: Observe critically the below cartoon, what do you think about dual protection?



Student: Dual protection" refers to the use of methods which will prevent both unwanted pregnancy and HIV/STI infections during sexual intercourse.

- Teacher write the main point and make a comment to connect learners' ideas with the lesson objective.
- Help learners to form the groups and provide time for discussion
- Display the image to the learners

Teacher: Discuss the means used for dual protection against unwanted pregnancies and STIs and HIV/AIDS.

Student: Strategies for dual protection against unwanted pregnancies are:

- Abstinence
- Barrier methods(use of condom)
- Antiviral medicines
- Voluntary male circumcision. This is for avoiding risk for HIV transmission

Activity 2

Teacher: Study the following cartoon and answer the questions



Teacher: Analyze behavior in the scenario in cartoon form above. What do you think can help them to be safe in their relation?

Student: Communication and negotiation can help them to be safe in their relation

Teacher: Discuss how this behavior can help to practice safer sex.

Student: By negotiating the one may be able to refuse or they may take other measures of protection

- Ask learners to observe the image
- Ask learners to discuss and record their findings
- Ask learners to present their findings
- Build on learners' ideas to expand their knowledge

Explanation.

Effective communication and discussion, sharing information, thoughts and feelings between people through speaking, writing or body language especially teenagers, increases the ability to engage in safer sex practices because by that discussion they prepare themselves they have time to think about risks and how to be safe by choosing adequate.

Activity 3

Teacher: What do you understand by contraceptive methods

Student: These are methods used to prevent unwanted pregnancies, help in family planning.

Application activity

Teacher: In your opinion, is it correct for youth to use contraceptive methods? Explain your answer.

Student: YES, it is correct for the youth to use contraceptive methods because they prevent them from unwanted pregnancies, HIV and STIs when they make sexual relation.

Lesson summary

Dual protection” refers to the use of methods which will prevent both unwanted pregnancy and HIV/ST infections during sexual intercourse

Strategies for dual protection against unwanted pregnancies are:

- Abstinence
- Barrier methods(use of condom)
- Antiviral medicines
- Voluntary male circumcision. This is for avoiding risk for HIV transmission

- Allow learners to careful observe this scenario in cartoon then ask them to answer questions
- Learners present their findings.
- Teacher connects learners’ideas with the real contents. Always notes are given
- Help learners to relate what they have learnt to real life experience by discussing on the asked question

Effective communication and discussion, sharing information, thoughts and feelings between people through speaking, writing or body language especially teenagers, increases the ability to engage in safer sex practices because by that discussion they prepare themselves they have time to think about risks and how to be safe by

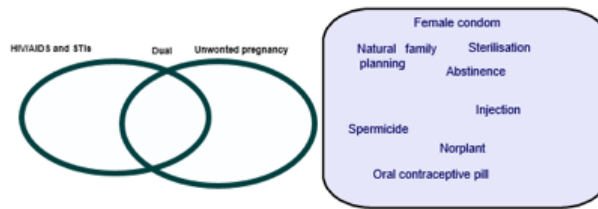
3. Assessment, and Conclusion (10 min)

Assessment questions

Teacher: What is dual protection?

Student: Dual protection" refers to the use of methods which will prevent both unwanted pregnancy and HIV/ST infections during sexual intercourse.

Teacher: Use the shown words bank to complete the diagram below



Student: Pregnancy: abstinence, sterilization, Norplant, injection, oral contraceptive pill, male condom female condom and natural family planning. STIs/AIDS: abstinence, male condom, female condom, dual union.

Conclusion

We are coming to the end of our lesson. We have mainly studied the strategies for dual protection against unwanted pregnancies, STIs and HIV. Hope everyone has captured the key content of this lesson.

- Provide an opportunity where students can ask questions, where the teacher can help every learner depending on his/her special educational needs, and ask some questions leading students to summarize the lesson learnt
- Provide opportunities for corrective feedback or positive feedback to students.
- If possible, take records of their performance after formative assessment

You will do the following homework to enhance your competences:

Homework

1. How can you avoid transmission of HIV and STIs?
2. Identify the following contraceptives:
 - a. Oral contraceptive pills
 - b. IUD
 - c. Female condom


Thank you for your attention and participation in this lesson, see you next time.

– Provide time for writing homework.

LESSON FROM UNIT

18

Rights of people living with HIV (PLHIV)

SUBJECT: Biology	Grade: S3	TIME: 40 minutes
LESSON: HIV/AIDS (Stigma, Treatment, Care and Support)		
TEACHING AND LEARNING MATERIALS: Scenario pictures, Chalkboard, Books		
SECTION/ STEPS	STEP –BY- STEP INSTRUCTIONS AND CONTENT	NOTICE TO THE TEACHER
<p>1. INTRODUCTION (10 MIN)</p>	<p>Teacher: Welcome to Biology lesson. I am sure you are going to enjoy today's lesson. Who can tell us the example of sexual transmitted diseases?</p> <p>Student: HIV/AIDS, Gonorrhoea,</p> <p>Teacher: What do you know on these diseases?</p> <p>Student: These diseases are transmitted through sexual relation and Some of these diseases are incurable.</p> <p>Teacher: Form groups of 4 learners. Observe carefully the pictures and answer the questions:</p> 	<ul style="list-style-type: none"> – Begin by gaining students' attention and readiness. – Ask general questions on the new unit to know the students' prerequisites. – Give time learners to think on asked questions and allow them to provide their answers.

What do you see on the diagram?

Student: Doctor and a patient.

Teacher: If you observe well, what is the patient suffering from?

Student: The patient has HIV/AIDS

Teacher: Which behavior of doctor and patient in this scenario? Is the patient happy for the provided service?

Student: The doctor did not treat the patient. The patient has not enjoyed his rights of medical services.

Teacher: What do you think we are going to learn in this lesson?

Student: Rights of people

Teacher: Yes, the lesson of today is “Rights of people living with HIV (PLHIV)”

The key unit competence is: To be able to explain the importance and key elements of living positively with HIV.

The lesson of today will allow you to achieve the following objectives:

- State the right of people living with HIV
- Explain the right to confidentiality about personal health status including HIV status.

Introductory Activity

Teacher: Many time, advertisement on social media talk about human right targeting vulnerable groups to protect them. State some examples of vulnerable groups.

Student: Children, Patients, old persons, People living with HIV.

- Connect the learners’ expectations related to this lesson to the key unit competence and lesson objectives.
- Ask learners the unit or lesson title.
- If learners do not announce them, announce and write them on the chalkboard.
- Communicate the key unit competence and lesson objectives.

Teacher: Do you think people living with HIV /AIDS have some rights?

Student: People living with HIV have rights as human being and vulnerable people.

Teacher: Explain the following: HIV and AIDS is not associated to death

Student: HIV and AIDS is not associated to death means that:

- You may continue to do your work even if you are an HIV positive.
- Mothers with HIV positive may give birth to an HIV negative baby.

2. LESSON DEVELOPMENT

(25 MIN)

Activity 1

Teacher: Display scenario pictures again then ask these questions



What right of PLHIV do you think have been violated?

Students' Presentation

1. Based on shown scenario, the right to medical treatment and care from health facilities was violated.

Teacher: Give Other rights of PLHIV

Students' presentation

- a. No PLHIV and AIDS should be discriminated against.
- b. No one can be dismissed from work because they are HIV+
- c. No one should be forced to take a HIV test in any situation.

- Allow learners to ask questions about the topic of the day.
- Motivate them and raise their interest in following carefully the lesson such that they can answer the key questions related to the rights of people living with HIV.
- Check before the pictures to be given to students.
- Ask learners to observe and answer the questions

- d. Children living with HIV and AIDS should be allowed to attend any school.(Refer to the student's book page 320)



Activity 2

Teacher: Give other rights for people living with HIV with focus on right to confidentiality.

Students' presentation

- An HIV positive have rights to medical treatment.
- HIV and AIDS is not associated to death.
- You may continue to do your work even if you are an HIV positive.
- Mothers with HIV positive may give birth to an HIV negative baby.

Application activity

Teacher: Angela is your sister. She discloses to her family that she is contaminated. Consequently, your father decides to stop her to attend the school and deprive her access to the medicine.

What advice can be given to that father?

- Ask a learner to present their findings/answers.
- Note on the chalkboard what the learner present.
- Always emphasize new concepts.
- Build on learners' ideas to expand their knowledge.
- After each activity, remember to put an energizer/warm up to capture learners' attention.
- Guide them until the whole lesson is explained.
- Use different questions to probe students to understand the content.
- Write on chalkboard the learners' answers
- Keep guiding learners in every step.

Students' presentation

Sensitize that father and tell him that people living with HIV have rights as all other people. Having HIV does not mean death. By accepting her as she is, we encourage her to adopt positive living with HIV so that she may continue to live productive life.

Lesson Summary

People living with HIV have right to:

- To medical treatment and care.
- Not be dismissed from work because they are HIV+
- Not be forced to take a HIV test.
- To attend any school.
- Confidentiality which is the right of an individual to have personal, identifiable medical information kept private.
- Test results cannot be shown to any other person without the permission of the person who took the test

Rights to confidentiality of people living with HIV

An HIV positive have rights to medical treatment.

- HIV and AIDS is not associated to death
- You may continue to do your work even if you are an HIV positive
- Mothers with HIV positive may give birth to an HIV negative baby

- Build a consensus after every activity and presentation.
- Allow learners to present their answers
- Teacher orients the learner's answers
- **NB:** The application activity helps learners to relate what they have learnt to real life experience

**3. ASSESSMENT
AND
CONCLUSION
(5)**

Assessment questions

Teacher: State the rights of people living with HIV

Student:

- No one may be forced to take HIV test.
- Test results may not be shown to any other person without the permission of one who took the test.
- Children who are HIV positive should be allowed to attend school

Teacher: What are some of the HIV-related discrimination and stigma?

Student: PLHIV get poor treatment at healthcare facility may be shunned by society

Teacher: What do you understand by right to confidentiality about PLHIV

Student: Everyone has right to confidentiality about their health status and should not be required to disclose their HIV status.

Conclusion

Teacher: We are coming to the end of our lesson. We have mainly studied the rights of people living with HIV, Confidentiality about PLHIV. Hope everyone has captured the key content of this lesson.

You will do the following homework to enhance your competences:

Homework

1. Can an HIV positive women give birth to an HIV negative baby? Explain.
2. State lights of people living with HIV.

Thank you for your participation in this lesson. See you next time!

- Provide the opportunity where students can ask questions
- Help them depending on their special educational needs.
- Ask probing questions that will lead to summary of the lesson.
- After summary, give assessment to check if the lesson objectives are achieved.
- Give opportunity to provide answers and this followed by feedback.
- Conclude the lesson by giving them the key points of the lesson and write the homework.
- Invite them for the next lesson.

LESSON FROM UNIT

19

Communication skills in consensual and safe sex

SUBJECT: Biology	Grade: S3	TIME: 40 minutes
LESSON: HIV/AIDS Sexual behaviours and sexual responses		
TEACHING AND LEARNING MATERIALS: Charts, S3 Biology book (pg. 332-333), note books, pens		
SECTION/ STEPS	STEP –BY- STEP INSTRUCTIONS AND CONTENT	NOTICE TO THE TEACHER
1. INTRODUCTION (10 MIN)	<p>Teacher: Welcome to Biology lesson, I am sure you are going to enjoy today's lesson.</p> <p>What are the methods used to prevent unwanted pregnancies?</p> <p>Student: The method used to prevent unwanted pregnancies include Abstinence and the use of condom.</p> <p>Teacher: What is the importance of abstinence?</p> <p>Student: Abstinence help us to prevent HIV/AIDS and unwanted pregnancies.</p> <p>Teacher: What do you think we are going to learn?</p> <p>Student: We are going to learn communication skills in consensual and safe sex.</p> <p>Teacher: Yes, you are right. This lesson will allow you to attain the following objectives</p>	<ul style="list-style-type: none"> – Begin by gaining students' attention and readiness. – Ask general questions on the new unit to know the students' prerequisites. – Give time learners to think on asked questions and allow them to provide their answers. – Start by gaining learners' attention and motivating them.

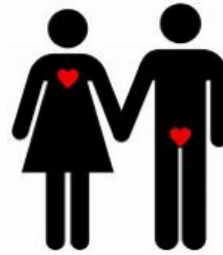
- Demonstrate effective communication of personal need and sexual limits
- Develop assertiveness and negotiation skills to help one to resist sexual pressure or reinforce the intention to practice safer sex.

Introductory activity

Teacher: Observe the images A and B and answer the asked questions.



a.



b.

Teacher: What messages translated by the images observed?

Student: The images show may be the need of sexual relationship.

Teacher: Are they enough for going ahead with sex? What may stop it?

Student: That is not enough to go ahead with sex. There is a need of verbal yes or no which may stop it.

- Give time learners to think on asked questions and allow them to provide their answers
- Connect the learners expectations related to this lesson to the key unit competence and objectives
- Present the images to learners
- Give learners opportunity to explore, discuss reflect on the introductory questions.
- Allow learners to ask question about the topic.
- Build on their questions and communicate the key questions

2. LESSON DEVELOPMENT

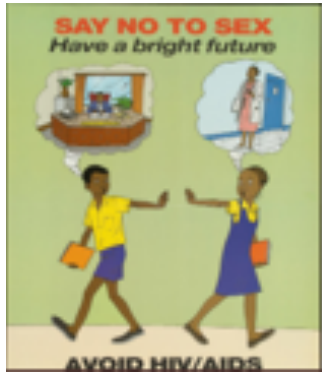
(25 MIN)

Learning Activity 1:

Effective Communication of personal needs and sexual limits

Teacher: Observe carefully the pictures A and B and answer the questions. Which one can show effective communication?

- Display the image and ask learners to observe carefully.
- Ask learners to explore, discuss and record their findings.



Student: The picture A showS effective communication.

Teacher: What may be the importance of good communication?

Student: Good communication allows taking appropriate decisions that help to prevent unwanted pregnancies and transmission of HIV / AIDS.

Application activity

Teacher: Communication of personal sexual limits is sometime non effective. Who are on many cases the cause (boys or girls)? Why?

Student: In some societies, girls are supposed to be submissive and accepting in their relations such that there is misleading information hips while boys are entitled to sex whenever they want it irrespective of their partner's decision. This may lead to non effective communication.

Lesson Summary

Communication is the process of sharing information, thoughts and feelings between people through speaking, writing or body language. In effective communication, transmitted content is received and understood by someone in the way it was intended.

- Ask a volunteer to come and summarize what they have learnt in this lesson.

	<p>Response of someone to your touch and kisses does not mean you go ahead and have sex with him or her, verbal yes is necessary to know that both of you are in agreement of what is to happen next.</p> <p>Consent of sex is one of the most important strategies in preventing transmission of STIs including HIV and unintended pregnancies.</p>	<ul style="list-style-type: none"> – Recapitulate by highlighting main point and correcting the volunteer learner.
<p>3. ASSESSMENT AND CONCLUSION (5 MIN)</p>	<p>Assessment questions</p> <p>Teacher: What is the effect of misleading information about sex to teenagers?</p> <p>Student: It results into unhealthy and hostile relationships that increases likelihood of transmitting STIs including HIV.</p> <p>Teacher: Explain the advantage of one expressing their opinions about sex freely.</p> <p>Student: It enables one to avoid engaging in sexual activity that they are uncomfortable with hence prevents unwanted pregnancies and transmission of STIs including HIV.</p> <p>Conclusion</p> <p>Teacher: We are coming to the end of our lesson we have mainly studied the definition of communication, how effective communication is transmitted and we studied how consent of sex is one of important strategies in preventing transmission of STIs like HIV/AIDS and unwanted pregnancies .</p> <p>Now let's give you a homework.</p> <p>Homework</p> <p>Why is it important to seek the verbal consent from a sexual partner before engaging in sexual activity?</p> <p>Teacher: Thank you for your participation, see you next time.</p>	

LESSON FROM UNIT

20

Key terms used in genetics

Subject: Biology	Grade: S3	DURATION: 40 minutes
LESSON: Genetics		
TEACHING AND LEARNING MATERIALS: : Manila paper, charts, books		
SECTION/ STEPS	STEP –BY- STEP INSTRUCTIONS AND CONTENT	NOTICE TO THE TEACHER
1. Introduction (10 minutes)	<p>Teacher: Welcome to Biology lesson. I am sure you are going to enjoy today's lesson. What are the two main types of variation?</p> <p>Student: The two main types of variation are discontinuous variation and continuous variation.</p> <p>Teacher: What is the cause of discontinuous variation?</p> <p>Student: Discontinuous variation is caused by genetic factors called genes found in the nucleus of the cell.</p> <p>Teacher: The genetic factors are inherited by the offspring from the parents, answer by true or false.</p> <p>Student: True, the genetic factors are inherited by the offspring from the parents.</p>	<ul style="list-style-type: none"> – Start by gaining learners' attention and motivating them. – Give time learners to think on asked questions and allow them to provide their answers – Connect the learners expectations related to this lesson to the key unit competence and objectives

Teacher: Define genetic

Student: Genetic is a branch of Biology that studies genes and heredity.

Teacher: In relation to answers provided to asked questions, what do you think we are going to learn?

Student: We are going to learn genetics

Teacher: We start the new unit called “genetics”.

The key unit competence of this unit is “To be able to explain how genes determine structure and function of individuals”.

The lesson of today is: Key terms used in genetics

This lesson will allow you to attain the following objectives:

- To define inheritance
- To define genetic terms used in genetics

Introductory activity

Teacher: Observe the following picture:



Teacher: Children have some characteristics similar to their parents. From the picture above, identify two characteristics got from parents?

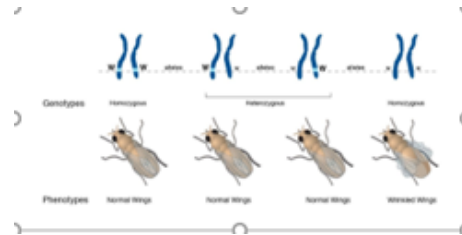
Student: Skin color, hair color, shape of eyes, shape of nose.

- Give learners opportunity to reflect on the introductory question.

2. Lesson development

25 min

Teacher: Observe the following charts and find the features that are common.



Student: The common structure are : structure of wings, eyes are the same.

Teacher: According to the genetic factors that come from parents to their offspring, who can define inheritance?

Student: Inheritance is the transmission of characters from the parent to their off springs.

Teacher: Genes are vehicles of inheritance and are responsible for the appearance of an organism, who can define gene?

Student: Gene is a small fragment of DNA.

Teacher: Some characteristics show variation in species. For example dogs have white, black and brown fur and a gene determines each color; Define allele.

Student: Allele is alternative form of gene

Teacher: Define chromosome

Student: Chromosome is the combination of many genes

Teacher: If two alleles are different, the individual is said to be heterozygous; What is heterozygous?

Student: Heterozygous is when individuals have different alleles. Example: Tt, Bb, Ss, Gg,...

- Provide resources to learners.
- Give instructions to learners.
- Ask the learners to present their findings.
- Build on learners' ideas to expand their knowledge.
- Explain the key concepts of the lesson and provide time to learners to ask some questions.

Teacher: If two alleles are the same, the individual is said to be homozygous; What is homozygous?

Student: Homozygous is when individuals possess identical alleles; Example: TT, Tt, tt, BB, Gg

Teacher: Define genotype

Student: Genotype is a genetic composition of many genes this consists of invisible character.

Genotype are represented by symbols. Example: TT, Tt, tt, BB, Gg

Teacher: Define phenotype

Student: Phenotype are visible characters of an organism. Phenotype are represented by word

Examples : red, black, short, tall.

Application activity:

Teacher: Suppose that you are going to visit the parent that the gives a birth of a baby; what are the criteria that can you base on to decide that this baby is similar to their parent?

Student: You can based on the physical characteristics like skin color, face, hair, shapes of feet

- Help learners to relate what they have learnt to real life experiences through discussion.
- Assess learners basing on the key questions to verify the achievement of learning objectives.
- Provide opportunities for corrective feedback or positive feedback to students.

3. Assessment and conclusion (5min)

As we conclude, let together review some of key terms that we learned by asking you the following questions

Define the following terms used in genetics:

- a) Inheritance
- b) Allele
- c) Recessive allele

- a. Inheritance is transmission of character from the parents to their offspring.
- b. Allele is alternative form of gene.
- c. Recessive allele is when an allele is not expressed its self in the presence of dominant allele. It is written in small letters.

Now I want to give you a homework so that you try to apply some of what have learned to day at your own.

Homework

- 1) The passing of genes from parents to offspring is
- 2) What is the physical structure in a cell that contains genetic information?
- 3) Differentiate between first generation and second generation

- Conclude the lesson by announcing the key subtitles and giving a homework to students

LESSON FROM UNIT

21

Advantages and disadvantages of genetically modified crops (GMOS)

Subject: Biology	Grade: S3	DURATION: 40 minutes
LESSON: GENE THERAPY TEACHING AND LEARNING MATERIALS: Lemons, Oranges, Potatoes		
SECTION/ STEPS	STEP –BY- STEP INSTRUCTIONS AND CONTENT	NOTICE TO THE TEACHER
1. Introduction (10 minutes)	<p>Teacher: Welcome to Biology lesson. I am sure you are going to enjoy today's lesson. What is genetic engineering?</p> <p>Student: Genetic engineering is the changing DNA code.</p> <p>Teacher: What is the importance of genetic engineering?</p> <p>Student: Genetic engineering makes plant more resistant to frost or more resistant to diseases.</p> <p>Teacher: Do you think genetic engineering on plants has some advantages in people's life?</p> <p>Student: Yes, it allows them to produce good crops.</p> <p>Teacher: What do you think we are going to learn?</p> <p>Student: We are going to learn advantages and disadvantages of genetically modified crops (GMOs)</p>	<ul style="list-style-type: none"> – Start by gaining learners' attention and motivating them. – Give time learners to think on asked questions and allow them to provide their answers

The lesson of today is: Advantages and disadvantages of genetically modified crops (GMOs)

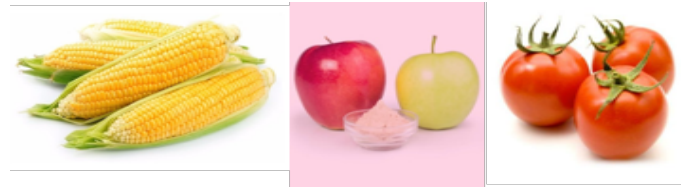
This lesson will allow you to attain the following objectives:

Explain the advantages and disadvantages of genetically modified crops.

Compare the advantages and disadvantages of natural crops and genetically modified crops.

Introductory activity

Teacher: Observe the following chart. What do you see on that diagram?



Student: These pictures show the different genetically modified crops (GMOs)

- Connect the learners expectations related to this lesson to the key unit competence and objectives

- Present to learners the introductory activity.

- Learners must be given time to think and note down their ideas.

- Provide resources to the learners

- Give instructions to the learners

- Ask the learner to present their findings

- Build on learners' ideas to expand their knowledge.

3. Lesson Development

(25 min)

Learning activity

Teacher: Compare the advantages and disadvantages of genetically modified crops (GMOs)

Student's Presentation

ADVANTAGES OF GENETICALLY MODIFIED (GMOs)

- Crops are more productive and high yield
- Offer more nutrition and flavor
- They eliminate allergy causing properties in some food
- Inbuilt resistance against pests and diseases in the crops

- Crops can withstand to the weather conditions
- More environment friendly as less herbicides and pesticides are required

DISADVANTAGES OF GENETICALLY MODIFIED (GMOs)

- Gene pollution can not be cleaned up
- It leads to the evolution of super weeds that are very difficult to control
- They can pose significant allergic risks to people
- They can cause new diseases and death to other organisms

Application activity

Teacher: Copy and complete this table by putting yes on the correct and no on the wrong statements.

Student's presentation

Advantages and disadvantages of GMO	Advantages	Disadvantages
Pesticide resistance	yes	no
Herbicide tolerance	yes	no
Diseases resistance	yes	no
Draught resistance	yes	no
Allergies	no	yes
Food have unnatural tastes	no	yes
Increase production	yes	no
Some organisms in ecosystem can be harmed	no	yes

- Explain the key concept of the lesson and provide time to learner to ask some questions
- Provide time of thinking and giving the real answers.
- Assess learners basing on the key question to verify the achievement of learning objectives

	<p>Lesson summary</p> <p>Genetic modified crops have both advantages and disadvantages.</p> <p>Advantages of genetic modified crops include diseases and drought resistance, increase productivity, pesticide and herbicide tolerance.</p> <p>Disadvantages of genetic modified crop include unnatural taste of food, some organism in ecosystem can be harmed.</p>	
<p>3. Assessment and Conclusion (5 min)</p>	<p>Assessment questions</p> <p>Teacher: What are the potential risks associated with genetically modified crops?</p> <p>Student: The potential risks associated with genetically modified crops are : Allergies, new diseases can develop, food have unnatural taste.</p> <p>Teacher: Classify the following into advantages and disadvantages of genetically modified crops</p> <ol style="list-style-type: none"> Crops are more productive and have higher yield They can cause allergic risks to the people More crops can grow on small land Some organisms in ecosystem could be harmed <p>Student: Advantages are a and c; Disadvantages are b and d.</p> <p>Teacher: Explain any two advantages and disadvantages of genetic engineering</p> <p>Student: The genetic modified crop are advantages because they increase production, help to prevent deficiencies diseases.</p> <p>May also have negative effects like: health problem, allergies, food have unnatural taste, some times destroy environment.</p>	<p>– Conclude the lesson by announcing the key subtitles and giving a homework to students.</p>

Conclusion

Teacher: We are coming to the end of our lesson. We have mainly studied the advantages and disadvantages of genetic modified crops. Hope everyone has captured the key content of this lesson.

You will do the following homework to enhance your competences:

Homework

Are genetically modified crops the answer to perennial food shortages in Africa?

LESSON FROM UNIT

22

Variation

Subject: Biology	Grade: S3	DURATION: 40 minutes
LESSON: Variation and adaptive features		
TEACHING AND LEARNING MATERIALS: : Charts, S3 Biology book (pg. 366S_370), different plants, note books, pens		
SECTION/ STEPS	STEP –BY- STEP INSTRUCTIONS AND CONTENT	NOTICE TO THE TEACHER
1. Introduction (10 minutes)	<p>Teacher: Welcome to Biology lesson, I am sure you are going to enjoy today’s lesson.</p> <p>Teacher: Look at your deskmate. Are you of the same skin color and hair, height or weights?</p> <p>Student: No, some are different.</p> <p>Teacher: Are all people on the world similar on external characteristics?</p> <p>Student: Some have white skin color other has black skin color, about weights some are small and others are big.</p> <p>Teacher: Why a farmer of maize who cultivated white seeds observe different colors of grains during harvesting?</p> <p>Student: Some maize plants get pollens from other plants and mix their external characteristics that result in change or variation of grains.</p>	<ul style="list-style-type: none"> – Begin by welcoming students and gaining their attention. – Give time learners to think on asked questions and allow them to provide their answers/ expectations.

Teacher: What do you think we are going to learn?

Student: We are going to learn **variation**.

Teacher: Yes, very good. We start the new unit called “**variation**”

The key unit competence of this unit is “To be able to explain that variation is caused by both genetic and environmental factors and adaptive features shown on different organisms”

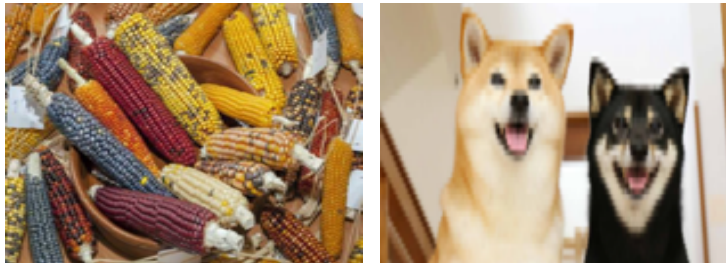
The lesson of today is: **Variation**

This lesson will allow you to attain the following objectives:

- Define variation
- Distinguish between phenotypic and genotypic variation

Introductory Activity

Teacher: Observe the following chart of organisms and answer the question. In what are they different?



Student: They differ in size and colors.

Teacher: Why are they different while they are of same species?

Student: The original species have changed some characteristics due to different factors.

- Announce the title of unit and the lesson.
- Connect the learners’ expectations related to this lesson to the key unit competence and lesson objectives.
- Give learners opportunity to reflect on the activities’ questions.
- Provide resources to learners (Pictures of same species.)
- Give instructions to learners
- Ask learners to explore and record their findings
- Ask learners to present their findings

2. Lesson Development

(25 min)

Learning activity 1

Teacher: Observe the displayed pictures of animals and plants of the same species and answer the questions.

After observing and comparing their characteristics (shape of ears, nose for animals; colour and size for maize), can you now tell the meaning of variation?



Student: Variation is defined as the difference between individuals of the same species.

Variation is both phenotypic and genotypic and is caused by separation of chromosomes during crossing-over and gamete formation.

Learning activity 2

Teacher: Observe the pictures below and answer the questions that follow:



- Build on learners' ideas to expand their knowledge
- Provide time of thinking and giving the real answers
- Help learners to relate what they have learnt to real life experience.
- Provide opportunities for students to ask questions.

Teacher: How do these maize seeds differ?

Student: They differ in color and size.

Teacher: What do you think are the causes of the differences?

Student: The causes of differences are genetic due to genes variation and phenotypic due to environmental factors e.g food, climate, diseases.

Teacher: Suggest the differences between genotypic and phenotypic variation.

Student: In genetic variation, traits reappear in offsprings while in phenotypic does not.

Variation is un changeable in genotypic and changeable in phenotypic with time eg loss of weight.

Application activity

Teacher: From the picture of hair/faces observed in previous lesson, outline

- a) Examples of variation that may occur in human.
- b) Examples of variation that you observe in your daily life.

Student:

- a) Examples of variation that may occur in human include the size, weight, skin color, eye color, hair, height.
- b) Examples of variation that observed in our daily life include variation in maize, beans, potatoes, cattle, etc.

Lesson summary

Variation is the difference that exist between organisms of the same species.

Two types of variation are phenotypic and genotypic. Organisms may differ in size, behavior, shape (phenotypic), height, hair, eye color (genotypic),etc.

Genotypic is caused by change in genes or their structure while phenotypic are caused by environmental changes.

- Assess learners basing on the key questions to verify achievement of learning objectives.
- Provide opportunities for corrective feedback or positive feedback to students.
- If possible, take records of their performance after formative assessment.

3. Assessment and Conclusion (5 min)

Assessment Questions

Teacher: Define the term variation.

Student: Variation is the difference that exist between organisms of the same species.

Teacher: State any two differences between phenotypic and genotypic variation

Student: In genetic variation, new offsprings appear and not the case in phenotypic variation.

Genotypic variation is unchangeable while phenotypic is changeable with time eg loss of weight

Teacher: What are the causes of variation in living organisms?

Student: Variation is caused by change in the structure of a gene or chromosome. It can also be caused by environment.

Conclusion

Teacher: We are coming to the end of our lesson. We have mainly studied the meaning of variation, types of variation and differences between phenotypic and genotypic variation. Hope everyone has captured the key content of this lesson.

You will do the following homework to enhance your competences:

Homework:

- 1) Group the following characteristics as either continuous or discontinuous: gender, blood group, weight, height and length of forearm.
- 2) Compare genetic variation to phenotypic variation.

- Conclude the lesson by announcing the key subtitles and giving a homework to students.

LESSON FROM UNIT

23

Natural selection

Subject: Biology	Grade: S3	DURATION: 40 minutes
<p>LESSON: Natural and artificial selection</p> <p>TEACHING AND LEARNING MATERIALS: Charts, manila papers, chalk board, etc.</p>		
SECTION/ STEPS	STEP –BY- STEP INSTRUCTIONS AND CONTENT	NOTICE TO THE TEACHER
<p>1. Introduction (10 minutes)</p>	<p>Teacher: Welcome to Biology lesson. I am sure you are going to enjoy today's lesson. Why do we have the first and the last in the class? What happen to the last one at the end of the school year?</p> <p>Student: The first has a high score (many marks) while the last one has low score. At the end of school year, the last one fails to move on next class or dismissed or repeat.</p> <p>Teacher: Where have all different species come from? i) from God's creation b) from evolution</p> <p>student: Religious people believe in God's creation but a few believe in evolution.</p> <p>Teacher: In our environment we have different crops like maize, Irish potatoes, beans and animals like cows, goats, chicken. Some are dying, new ones born, many others have disappeared completely and no longer exist in the living world.</p>	<ul style="list-style-type: none"> – Start by welcoming students and getting their readiness. – Give time learners to think on asked questions and allow them to provide their answers/ expectations.

What can be the cause of each case?

Student: The main causes of that include environment destruction, climate change and competition for food minerals.

Teacher: What do you think we are going to learn?

Student: We are going to learn Natural and artificial selection.

Teacher: You are right. We start the new unit called "Natural and artificial selection".

The key unit competence of this unit is "To be able to explain natural and artificial selection in relation to evolution and breeding"

The lesson of today is Natural selection.

This lesson will allow you attain the following objectives:

Introductory activity

Teacher: Have you ever heard that humans evolved from chimpanzee? Do you agree with that?

Student: Yes, I heard that. However, I don't know how it happened, so I don't agree or disagree with that.

Teacher: What is meant by the word "evolution"

Student: Evolution means gradual change in the inherited characteristics of a population over a long period of time through a process of natural or artificial selection.

Teacher: What do you understand by evolution theory? Who discovered that theory?

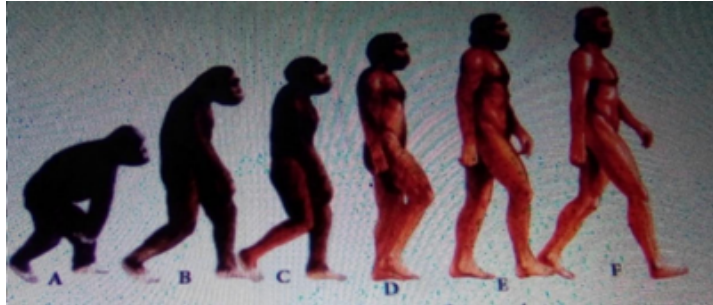
Student: Evolution theory states that "life on Earth began from simple forms which then slowly evolved into the present day organisms "it was discovered by an Australian monk Charles DARWIN.

- Connect the learners' expectations related to this lesson to the key unit competence and lesson objectives.
- Give learners opportunity to reflect on the activities' questions.
- Allow learners to ask questions about the topic of the day.
- Motivate them and raise their interest in following carefully the lesson such that they can contribute to the formulation of the key questions: " how does evolution take place through natural selection?"

2. Lesson Development (25 min)

Activity 1

Teacher: With your group members, look at the figure below of how human beings evolved, then answer to the question that follow:



1. Can you list down the very contrasting characteristics between figure A and F?
2. What do you think necessitated the change in characteristics between the early human being (A) and modern human being (F)?
3. What is the name for this change from A to F?

Students presentation

Figure A (Homohabilis)	Figure B (Homosapiens)
Skillful man	Wiseman
Low cranial capacity	High cranial capacity
Long arms	Short fore limbs for manipulating Or grasping things

- Students must be given time to think and note down their ideas.
- Build a consensus after every activity and presentation.
- Always emphasize new concepts.
- Ask a learner to present their findings/answers.
- Note on the chalkboard what the learner present.
- Ask other learners to complement the previous presenter until it is complete.

2. The change in characteristics between the early human being (A) and modern human being (F) was caused by insecurity, shortage of water, shortage of food, shortage of mates and overcrowding hence competition between the primitive human and other animals in that time.
3. That change from A to F is called Natural selection.

Application activity:

Teacher: How do you think human beings will look like 1 million years from now considering that we are living in the computer age?

Students: In one million age from now, technology will change our body so humans will be integrated with artificial intelligence, so there will be artificial beings (hybrid species).

Teacher: Define natural selection and discuss on its importance.

Student: Natural selection is the process by which species adapt to their environment. Natural selection leads to evolutionary change when individuals with certain characteristics have a greater survival or reproductive rate than other individuals in a population and pass on these inheritable genetic characteristics to their offspring.

Teacher: Suppose you are a farmer growing crops then weeds also grow amongst your crops, what would happen to your crops?

Student: Crops will not grow well due to competition with weeds.

Teacher: What can you do to make your crops grow well?

Student: I can use the following techniques such as Weeding, spraying with herbicides.

- Build on learners' ideas to expand their knowledge.
- After each activity, remember to put an energizer/warm up to capture learners' attention.
- Use different questions to probe students to understand the content.
- Request learners to answer the questions of application activity:
- Example of questions:
- Keep guiding learners in every step.
- Provide an opportunity where students can ask questions, where the teacher can help every learner depending on his/her special educational needs

	<p>Lesson Summary</p> <p>Natural selection is a process where organisms with favourable characteristics survive and reproduce than those with less favourable characteristics.</p> <p>Natural selection is caused by competition for light, shelter, diseases, overcrowding, limited food etc.</p> <ul style="list-style-type: none"> • A famous scientist, Charles Darwin studied this phenomenon of natural selection which later came to be called Darwin's theory of natural selection. Darwin worked together with Alfred Wallace to formulate this theory which says that members of a species compete with each other for resources and that individuals that are better adapted to their lifestyle have a better chance of surviving to reproduce. • There is variation in the characteristics of the species. These variations are of two types. Those variations that enable the organisms to compete effectively are referred to as beneficial or favourable variations. The variations that do not enable an organism to compete effectively are referred to as non beneficial variations. 	<ul style="list-style-type: none"> – Ask some questions leading students to summarize the lesson learnt. – Provide opportunities for corrective feedback or positive feedback to students. – If possible, take records of their performance and verify the achievement of learning objectives.
<p>3. Assessment and Conclusion (5 min)</p>	<p>ASSESSMENT</p> <p>Teacher: Through careful observation, Charles Darwin came to understand that</p> <ol style="list-style-type: none"> A) Populations of plants and animals in nature most often consist of individuals that are clones of each other. B) Those individuals whose variation gives them an advantage in staying alive long enough to reproduce are more likely to pass their traits on to the next generation. 	

- C) Populations of a species that become isolated from others by adapting to different environmental niches quickly become extinct.
- D) All of the above

Student: B

2. What causes the following in the theory of natural selection?

a) Struggle for existence

Student: Struggle for existence can be caused by

- Shortage of water
- Shortage of food
- Shortage of mates
- Overcrowding

b) Survival for the fittest.

Student: The survival of the fittest depends on the organism's ability to change with a changing environment.

Teacher: Distinguish between beneficial variations and non-beneficial variations.

Student: Beneficial variations allow an organism to compete effectively while non-beneficial variations do not allow an organism to compete favorably

Conclusion

Teacher: We are coming to the end of our lesson. We have mainly studied natural selection and justify why some organisms survive and others do not in an environment.

You will do the following homework to enhance your competences:

Homework:

1. With a good example, explain how evolution takes place through natural selection.
2. Explain the meaning of natural selection.

Answer:

1. A good example is with rabbits; every rabbit has a slight different combination of alleles that it inherited from its parents. Some rabbits will have alleles for thicker fur others thinner fur. If the environment gets lot colder, rabbits with thicker fur will survive than rabbits with thinner fur. The survivors reproduce offsprings with thicker fur. Over many generations, beneficial alleles widespread in population hence it has evolved a new population of rabbits that resist to lot coldness.
2. Natural selection is the process whereby organisms better adapted to their environment tend to survive and produce more offspring.

Thank you for your active participation, see you next time.