

## **FIRST TERM SCHEME OF WORK – BIOLOGY**

1. Living & Non Living Things; Meaning, Characteristics and Importance.
2. The Living Cells: Meaning and functions of cell organelles.
3. Differences between plant and animal cell: Organism: Identification of plant and animal's cells.
4. Structure of some common cells (Amoeba, Euglena, Paramecium) and their function.
5. Cellular organism: Tissue, organs, system and organism.
6. Environmental pollution: Definition, types, causes, effect and prevention and control.
7. Environmental conservation and safety: Meaning, maintaining balance, sources of earth's energy and importance of Nitrogen and Oxygen cycle.
8. Environmental conservation cont.: definition of carbon cycle, description and wild life conservation.
9. Environmental conservation and safety (Sanitation). Meaning, proper way of waste disposal. Technique and effect on the environment.
10. Revision and Examination.

### **WEEK 1**

#### **TOPIC: LIVING AND NON-LIVING THINGS**

**S/O:**

1. Define living and non-living things
2. Outline the characteristics of living things
3. Outline the importance of living and non-living things

Living things include those things that have life. Example of living things include; Man, Mango Tree, Grass, Rabbit etc.

Non Living Things include those things that do not have life. Examples include, chair, stone, table, house air, soil etc.

#### **CHARACTERISTICS OF LIVING THINGS**

1. Movement or Locomotion: This is the ability of organism to move their whole body or a part of their body.
2. Respiration: This is the breakdown of food substance in the presence or absence of oxygen to release energy for life processes. It is described as aerobic when oxygen is used and anaerobic when oxygen is not utilized.

3. Nutrition/Feeding: This refers to the process of obtaining and manufacturing food and utilizing it for growth, respiration and reproduction.
4. Excretion: This is the removal of waste product of metabolism e.g. water, carbon dioxide.
5. Irritability or Sensitivity: This is the ability to respond to changes or stimuli in the environment.
6. Growth: This refers to the permanent increase in size and weight of an organism due to the addition of living cells.
7. Reproduction: This is the ability of living organisms to give birth to young ones.
8. Death: All living things have a limited period of existence.

### **IMPORTANCE OF LIVING THINGS**

1. Living things serve as food e.g. wheat, rice, fruits are all from plants, while meat, egg and, milk are gotten from animals.
2. Beautification and art e.g. ornamental plants (Flowers).
3. Models for research and drug development.
4. Many species of animals serve as pets e.g. dogs and cats.
5. Production of useful materials e.g. cotton from cotton plant, wood from trees, gums etc.

### **IMPORTANCE OF NON LIVING THINGS**

Living things need non-living things to survive, without food, water and air, living things die. Sunlight, shelter and soil are also important for living things. Living things meet their needs from living and non-living things.

### **ASSIGNMENT**

1. Enumerate 10 products made from living things that are of importance to man.
2. Enumerate 10 products made from non-living things that are of importance to man.

## **WEEK 2**

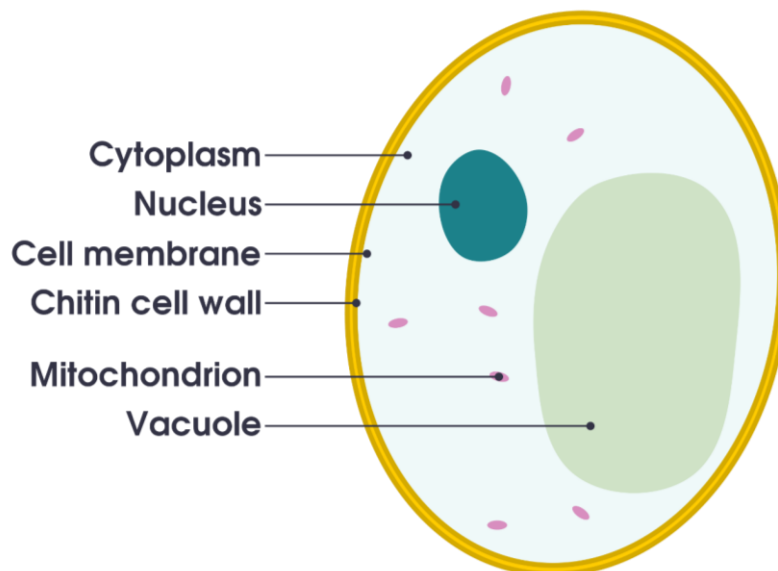
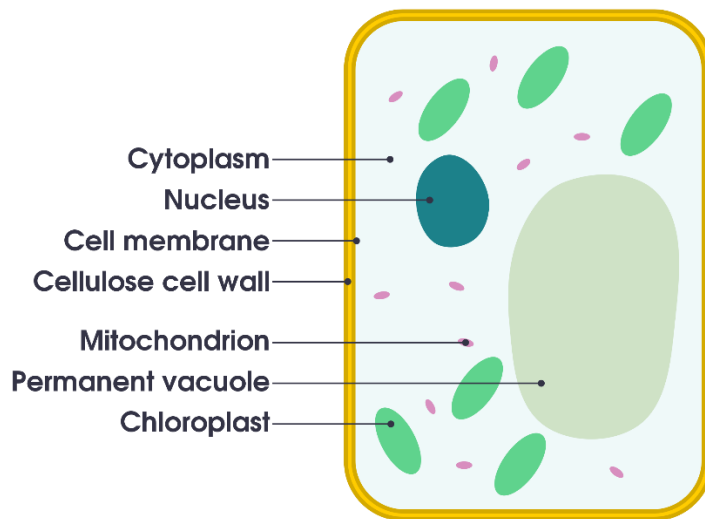
### **THE LIVING CELL**

**S/O:** At the end of this lesson, I should be able to:

1. Define a cell
2. Describe the general structure of a cell
3. State the structure and differences between plant and animal cells

#### 4. State the functions of cell organelles

Cell is the basic unit of life. Thin slices of plants and animals are made up of plants and animals are made up of units. These units are called cells. This name was given to them by Robert Hooke who discounted them in the 1660s after looking at thin slices of cork through a microscope. Plants and animals are made up of these units, hence we have plants cells and animal cells.



## FUNCTION OF CELL ORGANS

1. Nucleus: Control all life activity of a cell and stores hereditary information's.
2. Mitochondria: They are sites of respiration where energy is release.
3. Vacuole: This helps to remove excess water.
4. Cytoplasm: The substance that fills the cells.
5. Chloroplast: These contain chlorophyll which enables green plants to make food during photosynthesis.
6. Cell Wall: This is made of cellulose. It protects and give shape to the cells.
7. Cell Membrane: It encloses the substance which fills the cells (Cytoplasm), it absorbs materials into the cells and protect the cells.
8. Golgi body and endoplasmic reticulum: Aid transport and distribution of materials.

## DIFFERENCE BETWEEN PLANT AND ANIMAL CELLS

### Plant Cells

1. Cellulose cell wall present
2. One large vacuoles
3. Chloroplast present
4. Has a regular shape
5. Cytoplasm does not fill the cells
6. Stores carbohydrate as starch

### Animals Cells

- Cell wall absent
- Small vacuoles
- Chloroplast absent
- Has irregular shape
- Cytoplasm fills the cells
- Stores carbohydrate as glycogen

## ASSIGNMENT

Draw and label plant and animal cell using a card board.

### BECE 2015

7. Animals store excess glucoses in the liver in the form of:
  - a. Cellulose
  - b. Glucogen
  - c. Glycogen
  - d. Starch
  - e. Sucrose

## WEEK 3

### TOPIC: DIFFERENCES BETWEEN PLANT AND ANIMAL CELL

**Specific Objectives:** At the end of this lesson, students should be able to:

1. Identify plant and animal cell
2. State and explain the differences between plants and animal cell.

#### IDENTIFICATION OF PLANT CELL

Plant cells can be viewed when a thin slice of a plant is observed under a microscope. There are specific and several features that can be used to identify a plant cell. Some of such features include:

1. **Possession of Cell Wall:** The plant cell has a rigid cell wall that is made up of cellulose material. This gives the whole plant cell a rigid shape and protects the cytoplasm.
2. **Possession of Large Vacuole:** The vacuole is responsible for removing excess water. It contains a liquid called Cell Sap. The cells have a large vacuole which takes up a lot of space in the cytoplasm. This can be used to identify a plant cell.

**Possession of Chloroplast:** Plants manufacture their food through photosynthesis which requires water, carbon dioxide and solar energy (energy from sunlight) to occur. The chloroplast contains a green pigment which traps solar energy from the sun and makes it available for photosynthesis. This pigment is called chlorophyll.

Example of animal cell: Palisade mesophyll cell, found in the leaf.

#### IDENTIFICATION OF ANIMAL CELL

1. **Irregular shape:** Animal cells have irregular shape due to the lack of a cellulose cell wall around the cell membrane.
2. **Several small vacuoles:** Animal cells have small vacuoles distributed in the cytoplasm of the cell. Some animal cells lack vacuoles.
3. **Absence of Chloroplast:** Animals in general cannot manufacture food. This is due to the absence of chloroplast in their cells.

**Example of animal cell:** Red blood cell, white blood cell, nerve cells (neurone), human cheek cell e.t.c.

### DIFFERENCES BETWEEN PLANT AND ANIMAL CELLS

PLANT CELLS	ANIMAL CELLS
1. Cell wall present	Cell wall absent
2. Cell vacuoles present	Cells vacuoles normally absent
3. Chloroplast, present	Chloroplasts absent
4. Cytoplasm does not fill the cell	Cytoplasm fills the cell
5. Cell vacuole is large	Cell vacuole if present is small
6. Cell size is large	Cell size is small

### SIMILARITIES BETWEEN PLANT AND ANIMAL CELL

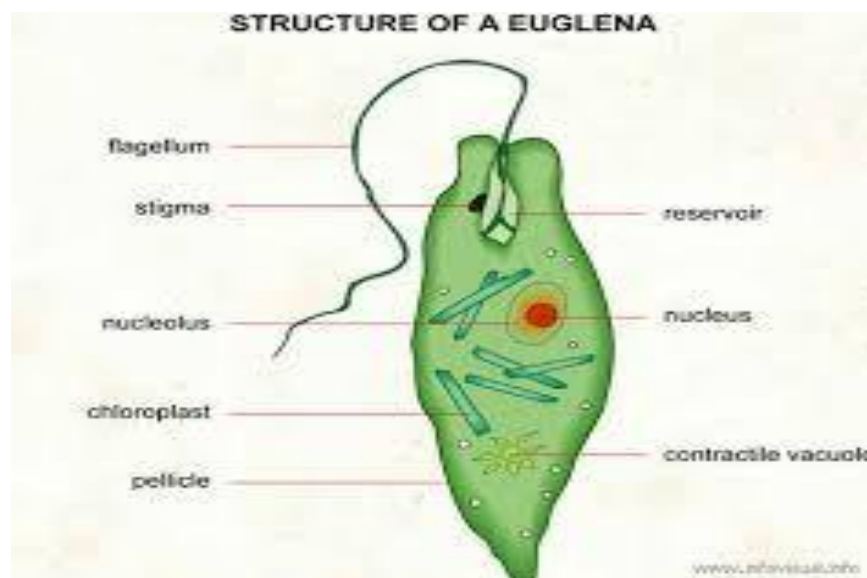
1. Presence of cell membrane in both cells
2. Presence of cytoplasm
3. Presence of nucleus
4. Presence of mitochondria

**WEEK 4:**  
**TOPIC: STRUCTURE OF COMMON CELLS**

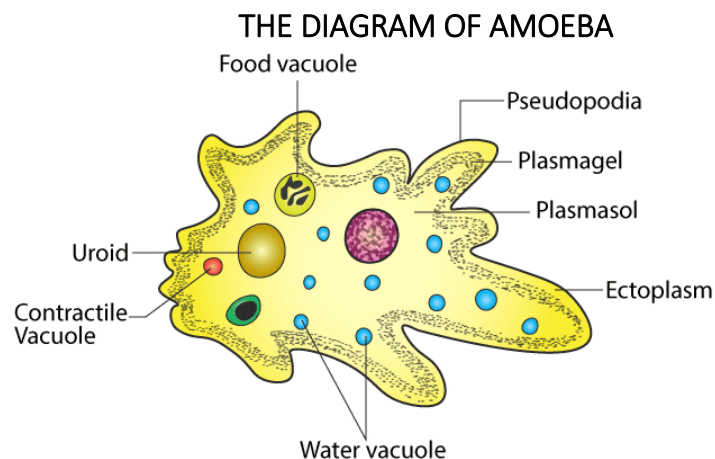
**Specific objectives:** AT the end of this lesson, I should be able to:

1. Define cellular organisms
2. Identify the structure & function of some common cellular organisms
3. Draw examples of some cellular organisms e.g. euglena, paramecium and amoeba.
4. Identify the structure and function of some common cellular organization

**Cellular Organisms** refers to those living organism that exist as cells and are able to carry out life processes as a single cell e.g. amoeba, euglena, and paramecium.



Euglena lives freely as a single cell, it possesses both plant and animal features and it carries out life processes with the aid of it's organelles which include the following: Flagellum (for movement), gullet (for passage of food), mitochondria (site of respiration and energy production), chloroplast (synthesis of food), eyespot (for sensitivity to light), starch granules (for storing synthesized food), contractile vacuole (for controlling water) & nucleus e.t.c.

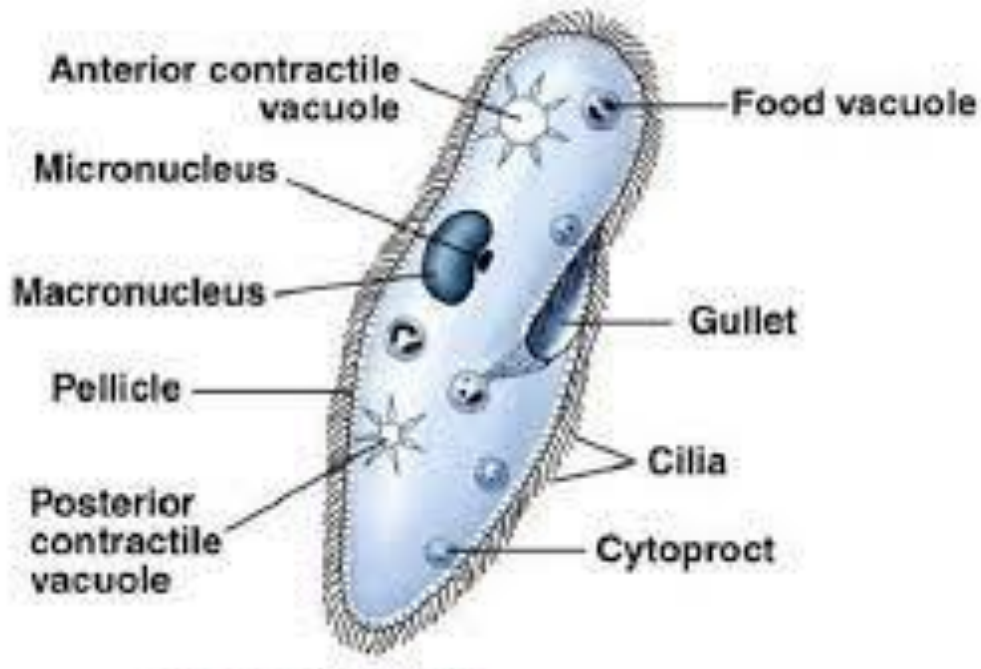


**NB:** Identify the structure and components of some cellular organisms & their functions.

It is shapeless and does not have a fixed shape.

This is also a free living aquatic organism consisting of a single cell.

It possesses the following structures: Pseudopodium (for movement), food vacuole (for digestion of food), nucleus, membrane e.t.c.



### PARAMECIUM

Paramecium is also a cellular organism that has the shape of a slippers that possess the following structures: Cilia (for movement), gullet (for food passage), micro and mega nucleus, anterior and posterior vacuole e.t.c.

**BECE (2016, paper II, Question 2)**

The basic unit of life is

(a) Cell (b) Organ (c) Organism (d) System (e) Tissues

**BECE (2018, paper I, Question II)**

The outer layer of animal cell is known as \_\_\_\_\_ (a) Cell membrane (b) Cytoplasm (c) Nuclear membrane (d) nucleus (e) Vacuole



## ASSIGNMENT

Tick present if the organism possesses the organelle listed.

Organelle	Amoeba	Paramecium	Euglena
Pseudopodia			
Cell membrane			
Chloroplast			
Flagellum			
Cilia			
Gullet			

## WEEK 5

### TOPIC: ORGANISATION OF LIFE

**Specific objectives:** At the end of this lesson, I should be able to:

- 1) Define Organization of life
- 2) State the level of organization of life
- 3) Identify examples for each level of organization of life

Living things are highly organized and this organization occurs in levels. The lower level is made out of simple structures, while the next level consists of more complex structure and so on.

There are four levels in which life is organized.

CELL → TISSUES → ORGANS → SYSTEM

#### ❖ Cell (First Level)

This is the basic unit of life. Some organisms exist as just a cell (unicellular) while others consist of many cells. Examples of unicellular organisms are Amoeba, Euglena e.t.c. Examples of cells in plants include: phloem cells in animals include: blood cells, spermatozoa, red blood cell, white blood cell, nerve cells, rod and con cells

#### ❖ Tissues (Second Level)

A tissue refers to a group of similar cells forming a particular function. Example of tissues in plants include: mesophyll layer of leaves, epidermal tissue, sclerenchyma, xylem and parenchyma tissues. Examples of tissue in animals include: blood, bone, muscle e.t.c. some organisms like sponge exist at tissue – level

❖ **Organs (Third Level)**

This refers to a group of tissue that comes together to perform a specific function. Examples in plants are leaves, roots, flower, stems and seeds. Example in animals are eyes, ears, stomach, heart, brain, kidney etc.

❖ **Systems (Fourth Level)**

This is a group of similar organs which work together to perform specific functions. Examples in plants include the shoot and root system. Example in animals are digestive, respiratory, skeletal, nervous, circulatory etc.

(WASSCE JUNE, 1998)

STATE THE LEVELS OF ORGANISATION OF LIFE AND GIVE 3 EXAMPLES OF EACH OF THE LEVEL

**WEEK 6**

**TOPIC: ENVIRONMENTAL POLLUTION**

Specific Objectives: At the end of this lesson – students should be able to:

1. Define Environmental Pollution
2. State the type of environmental pollution
3. Outline causes & efforts of environmental pollution
4. Describe ways in which environmental pollution can be controlled and prevented

Environmental pollution is the release of harmful substances (contaminants) into the environment that endangers life. When this contaminant is released into the soil/land it is called land pollution, when released into the atmosphere it is called air pollution and when released into water bodies it is called water pollution. Pollutants can be Gases, liquid or solids.

**TYPES OF ENVIRONMENTAL POLLUTION**

Air Pollution ----- Water Pollution ----- Land/Soil Pollution

**CONTAMINANTS THAT CAUSE AIR POLLUTION AND THEIR EFFECTS**

1. Sand, dust, pollen, seeds, soot and other particles released into the air during burning.
2. Carbon dioxide can pollute the air when in excess.

3. Carbon dioxide can be released from burning petroleum products, wood into the air. This binds to the red blood cells and prevent oxygen transport.
4. Sulphur (iv) oxide  $\text{SO}_2$  : This is produced from burning of coal, it can lead to acid which destroys plants and building material

#### **CONTAMINANTS THAT CAUSE WATER POLLUTION AND THEIR EFFECT**

- 1) Savage waste decreases the removal of oxygen in water bodies leading to fool smelling water containing microbes.
- 2) Fertilizers washed from farmlands can also run into water bodies increasing the growth of algae which leads to decrease in the oxygen in water and leads to foul smelling water.
- 3) Heavy metals like lead and mercury
- 4) Oil spillage.

#### **CONTAMINANTS THAT CAUSE SOIL POLLUTION AND THEIR EFFECT**

- 1) Non-biodegradable waste (refuse dumping) like nylon, plastic, metals.
- 2) Over use of agricultural chemicals like fertilizers and pesticides leads to soil pollution.

#### **EFFECTS OF ENVIRONMENTAL POLLUTION**

- 1) It destroys the environment and its beauty
- 2) It endangers life (humans & animals & plants) as it can lead to diseases.
- 3) It causes harmful climatic events like global warming and acid rain.

#### **CONTROL & PREVENTION OF ENVIRONMENTAL POLLUTION**

- 1) Savage treatment: treatment: This is the removal of harmful microorganisms and solid waste from sewage before passing into water bodies.
- 2) Proper disposal of waste material.
- 3) Distancing industries from communities
- 4) Minimizing/Reducing the use of agriculture chemicals.

#### **BECE 2018 QUESTION 34**

#### **OIL SPILLAGE LEADS TO THE FOLLOWING EXCEPT:**

- (a) Damage to beaches
- (b) Enhancing aquatic life
- (c) Environ degradation
- (d) Lose of farm land
- (e) Water pollution

## WEEK 7

### TOPIC: ENVIRONMENTAL AND SAFETY 1 (MAINTAINING BALANCE)

**Specific Objectives:** At the end of this lesson, I should be able to:

1. Define environmental conservation and safety.
2. State the source of earth's energy
3. Discuss the importance of the oxygen and water cycle in nature.

### INTRODUCTION

The earth is occupied by living things and this part of the earth is called, THE BIOSPHERE. Living things depend on the non-living part of the earth e.g. plants obtain carbon dioxide and water just as humans obtain oxygen from the non-living environment but when they die these chemicals return back to the non-living part of the earth through decay. This cycle of chemical substance creates chemical cycle such as water, carbon and nitrogen cycle. Also living things depend on other living things e.g. animals eat plants. Therefore, living things and non-living things maintain a balance that must be kept to make sure the environment is protected. The process of protecting the cycle of chemicals, animals, plants in our environment and protecting our environment from destruction is called environmental conservation.

### THE SUN AS THE SOURCE OF EARTH'S ENERGY

The earth is 108 million kilometers away from the sun. The earth has no energy of her own. The earth's present energy is obtained from the radiant energy of the sun through:

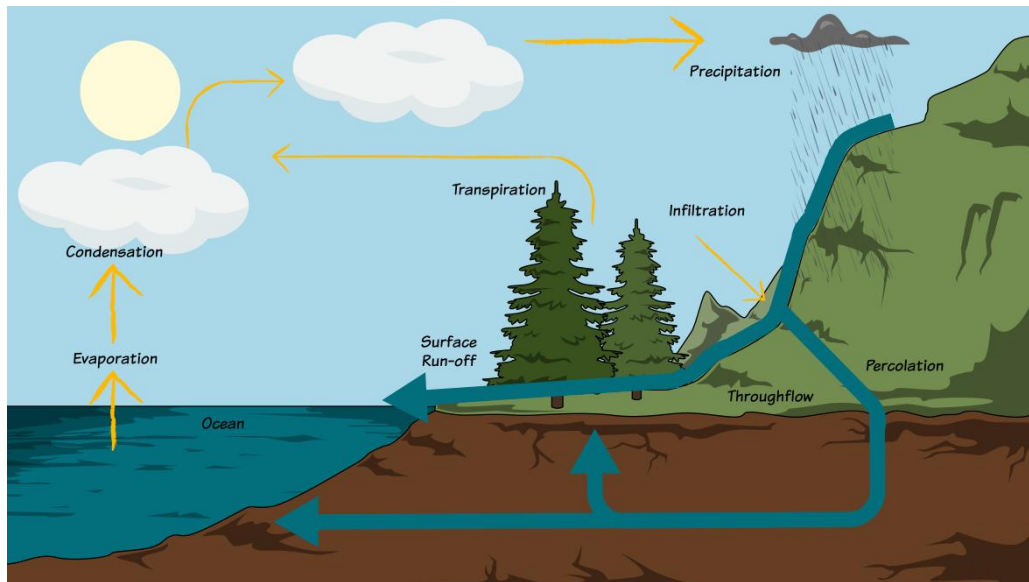
- i. Photosynthesis: plants capture sunlight and use it to convert water and  $\text{CO}_2$  to sugar. Which they use to make carbohydrate, fats and oil and protein which contain chemical energy.

Solar Energy  $\longrightarrow$  Photosynthesis  $\longrightarrow$  Chemical Energy  
(Plants)

- ii. The chemical energy in plants is taken in by animals that feed on plants (herbivores). The herbivores store some energy and lose some of the energy as heat as they move around and live.
- iii. Animals that feed on other animals (carnivores) obtain this chemical energy. They store and also lose some as heat.

- iv. Decay: When plants and animals die, they lose this chemical to the soil by decomposition. This dead plant and animals, are also converted to coal and petroleum which is used today to provide energy when they are burnt.

**NOTE:** In all these chemicals like: water, carbon, nitrogen and oxygen leaves the atmosphere to the soil and back to the atmosphere in form of a cycle.

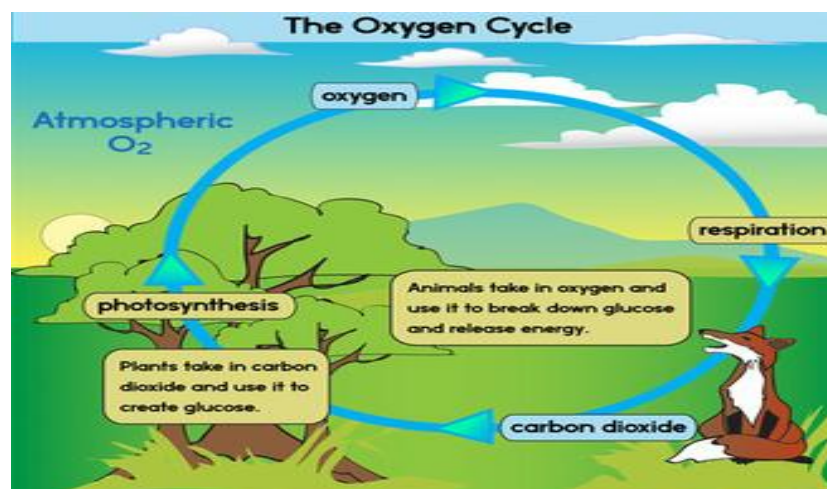


## THE WATER CYCLE

Water cycle occurs by:

1. Transpiration: Removal of water from the leaves of plants to the atmosphere.
2. Evaporation: Heat from the sun causing lake ponds and ocean to form vapour which form clouds in the atmosphere
3. Precipitation: consideration in clouds causes rain.
4. Infiltration: Rain water enters the soil and for water under the ground and above.
5. Percolation: Underground water flows into ponds, rivers and seas.

## OXYGEN CYCLE



## IMPORTANCE OF WATER AND OXYGEN CYCLE

The cycle ensures the continuous availability of:

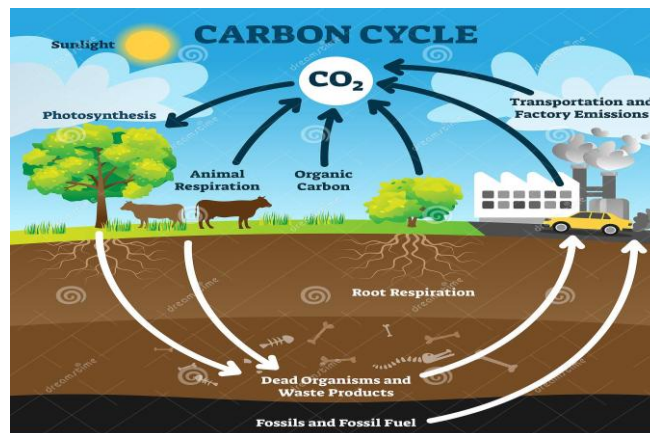
1. Oxygen for respiration and burning.
2. Oxygen for respiration in plants.
3. Water for human use.
4. Water for environmental recreation e.g. rivers and lakes.
5. Habitats for marine organisms.

## 6. WEEK 8

### ENVIRONMENTAL CONSERVATION COUNT

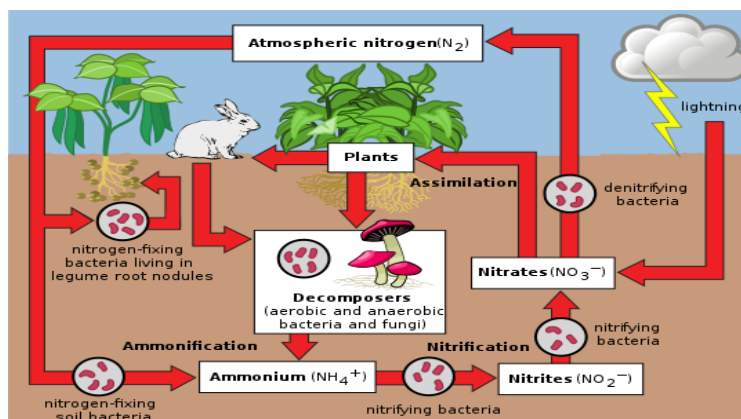
Specific objectives: At the end of this lesson, I should be able:

1. Draw and explain the carbon cycle
2. Draw and explain the Nitrogen cycle
3. Define conservation listing examples of important resources to be conserved.



The carbon cycle refers to the path in which carbon from living things to non-living things and back to living things in nature. This is the circulation of carbon in nature.

## THE NITROGEN CYCLE



This is the path in which nitrogen moves from living things to non-living things and back to living things in nature. This is the circulation of nitrogen in nature.

1. Conservation of energy: Energy comes from the sun and this energy is carefully used to prevent waste through transfer from non-living organisms.

Sun  $\xrightarrow{\text{Photosynthesis}}$  Plants  $\longrightarrow$  Herbivore  $\xrightarrow{\text{Goat}}$  Carnivore (Lion)  $\longrightarrow$  Omnivore (man)

2. Conservation of water: The water cycle provides a system of conserving water by reducing its usage water is also conserved
3. Conservation of wildlife: Wild life includes all plants and animals which live FREE in nature, not in farms/homes of humans/zoological gardens. They are of great importance as they produce food products, and material products e.g. timber.

One way of conserving wild life is by establishing wildlife reserves.

#### Example of wild life reserves in Nigeria

1. Sambisa Game RESERVE in Borno State
2. Cross River National Park in Cross River State
3. National Park in Taraba State
4. Kainji Lake and National game park in Niger State
5. Jos wild life parks and zoological gardens in Plateau State.

#### WAEC

##### SSCE JUNE 1997

Q29: The reduction of nitrates to gaseous nitrogen is (A) Nitrogen Fixing (B) Nitrogen Cycle (C) Ammonification (D) Putrefaction (E) Denitrification

##### SSCE JUNE 1997

Q43 which of this is the correct sequence for energy transfer and nutrient cycle among living things in an ecosystem?

- (A) Consumer ----- Producers ----- Decomposers
- (B) Producers ----- Decomposers ----- Consumers
- (C) Decomposers --- Producers ----- Consumers
- (D) Producers ----- Consumers ----- Decomposers

WEEK 9

ENVIRONMENTAL CONSERVATION AND SAFETY (SANITATION)

**Specific Objectives:** At the end of this, lesson, students should be able to:

- (i) Define environmental sanitation stating how it is practiced in Nigeria.
- (ii) Describe two major ways environmental sanitation can be ensured
- (iii) State the need for environmental sanitation

Environmental Sanitation refers to the process of keeping our environment clean and healthy around 1985, the Federal Government of Nigeria introduced the observance of the last Saturday of each month as environmental sanitation day on this day youths and adults spend the time from 7:00am to 10:00am in cleaning the environment.

It is important to note that wastes affect environmental balance and destroy the environment. Other activities like deforestation, excessive use of agricultural chemicals also destroys the environment.

(A) Environmental Sanitation can be ensured through proper disposal of refuse and requires three activities namely: (1) Refuse Collection (2) Sorting of Refuse (3) Refuse disposal

1. Refuse collection: Refuse is most easily collected in dust bins and emptied in a refuse collection center.
2. Sorting of refuse: Refuse is separated into different kinds namely, plastic, glass, paper. This is because different kinds of refuse are disposed differently
3. Refuse disposal: This method includes:
  - i) Throwing decomposable materials (e.g. plants and animals remains) into farmlands to decay
  - ii) Burning combustible materials e.g. paper
  - iii) Materials which are not burnt can be used to fill land (land filling)
  - iv) Recycling: This means using again what has been used before e.g. glass, metal and papers can be recycled.

(B) Environmental Sanitation can also be ensured through proper sewage disposal:

Sewage refers to waste water from toilet and kitchen sink. Water closet and sinks lead the waste water into septic tanks where the waste is decomposed by bacteria and after a long time overflows into the soak away pit. This whole system is clean and odorless and prevents spread of disease.



### **NEED FOR ENVIRONMENTAL SANITATION**

The need for environmental sanitation is to ensure a clean environment, free from diseases and toxic material. This ensures balance in nature and services of life.

BECE 2016 (II)

Liquid waste consisting of feaces, urine and water is called .....?

(A) Element (B) Garbage (C) Refuse (D) Sewage (E) Waste

**TASK: Presentation on Environmental Conservation & Environmental Collection.**