THIRD TERM SCHEME OF WORK FOR BASIC 8 BIOLOGY

WEEK	TOPICS	CONTENT
1	Sense Organs	Meaning, Parts and functions.
2	Sense Organs 2	Functions of the sense organs.
3	Sense Organs 3	The tongue and its functions.
4	Sense Organs 4	The nose; Structure and functions.
5	Sense Organs 5	Meaning parts and functions of the eye.
6	Sense Organs 6	Meaning parts and function of the ear.
7	Sense Organs 7	Defects and correction of the eye and ear.
8	Metabolism in the human body 1	Meaning of metabolism; digestion and absorption.
9	Metabolism in the human body 2	Storage form of excesses (nutrients) and problems associated with storage.
10	The Soil	Definition, properties, uses, composition and importance of soil.
11	Revision	
12	Examination	

WEEK 1/2
TOPIC: SENSE ORGANS
Specific objectives: at the end of this lesson students should be able to :
-Define sense organs
-Outline types of sense organs
-State the function of the various types of sense organs.

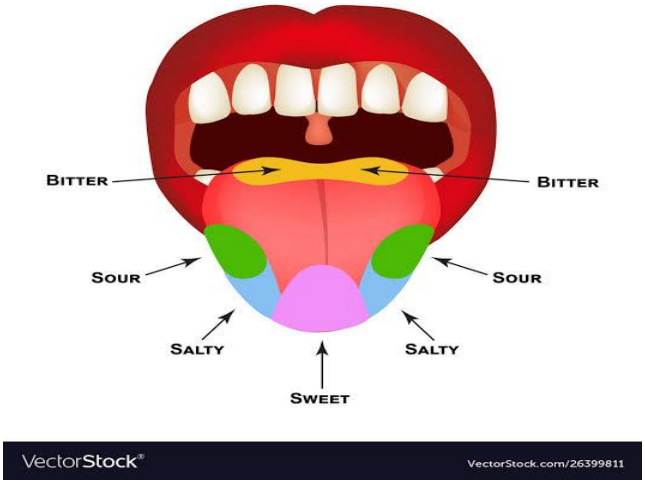
A sense organ is defined as a group of specialized cells, tissues, or receptors which can receive, perceive stimulus and transmit the information/impulse/message to the central nervous system.

A receptor refers to a sensory cell which receives stimuli, initiate and transmit impulse through neurons to the nervous system.

Types of sense organs	**Function**
Eye	Sense of sight or vision
Nose	Sense of smell
Tongue	Sense of taste
Ear	Sense of hearing and balance
Skin	Sense of touch, pain, heat, cold or pressure.

WEEK 3
Topic: Sense Organ 3
Sub-topic: The tongue and its function
Specific Objectives: at the end of this lesson, students should be able to:
-describe the structure and function of the tongue as a sense organ.

The tongue is the organ responsible for the sense of taste. Sensory cells for taste are grouped into taste buds. Taste buds are receptors for initiating stimulus from chemical solutions of food, drinks and other substances placed on the tongue. They are connected to the brain by nerves as the brain interprets what is been tasted.



THE HUMAN TONGUE SHOWING THE FOUR PRIMARY AREAS OF TASTE

The tongue is sensitive to four primary tastes namely: sweet (tip of the tongue), salty (lower sides of the tongue), sour (upper sides of the tongue) and bitter (back of the tongue). The tongue also is sensitive to temperature and texture of food. Taste by the tongue can be affected by temperature, state of health, opened or closed nostrils, and the number of foods been eaten at a time.

WEEK 5

Topic: Sense Organs 4

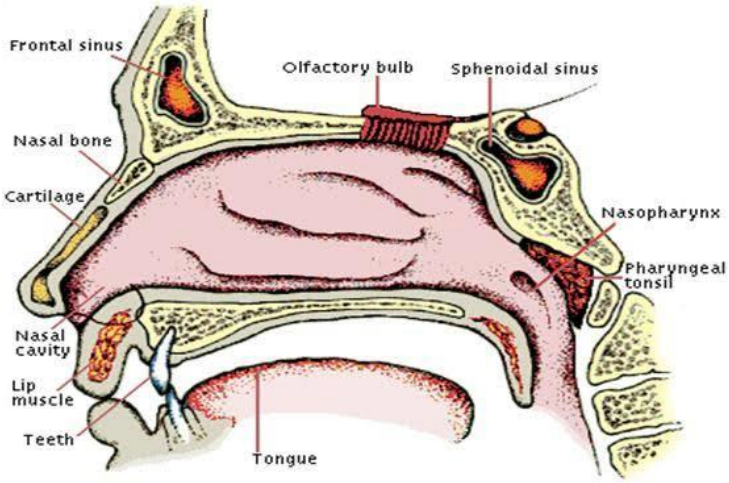
Sub-topic: The nose

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

-Describe the internal structure and function of the nose as a sense organ.

The organ of smell in humans is the nose, it is also called the olfactory organ. The olfactory organ consists of the olfactory lobe leading from the brain to the nasal cavity, olfactory nerves, smell receptors embedded in the mucus layer. Humans have a poor sense of smell because prolonged exposure to a particular smell prevents it from being perceived (this is an adaptive mechanism and explains why an individual with body odour will be unable to perceive himself or herself)

STRUCTURE OF THE HUMAN NOSE



PROCESS INVOLVED IN THE PERCEPTION OF SMELL

The nose functions well when wet. The smell receptors embedded in the mucus layer are stimulated by chemical substances present in the air which dissolve in the mucus layer. The impulse generated is sent via the nerves and olfactory lobe to the brain for interpretation.

WEEK 5

Topic: Sense Organs 5

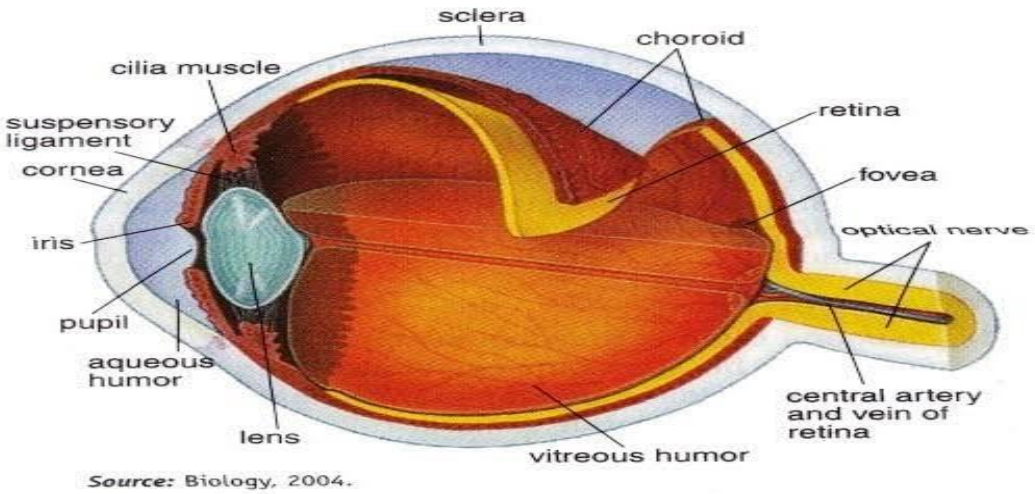
Sub-topic: The Eye

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

-describe the structure and function of the eye as a sense organ

The eye is the organ of sight in vertebrates. The mammalian eye is spherical in shape and consist of the following protective structures; eye socket, eyelids, eye lashes, tear glands and conjunctiva. The eye socket hold the eyeballs by via several muscles, the eyelids are folds of skin for protecting the eye from foreign substances, the eyelashes are long bristle hairs that protect the eye from dust, the tear gland or lacrimal gland secretes a liquid that contains lysozyme which kills bacteria and the conjunctiva gives the eye shape and protects its inner parts.

STRUCTURE OF THE EYE



Source: Biology, 2004.

Figure 8.20 The structure of eye.

The eye consists of three layers namely; The sclerotic /outer layer, the choroid /middle layer, and the inner retina.

SCLEROTIC LAYER

This is also called the white eye; it gives shape and firmness to the eye. It also protects the inner part of the eye. This layer consists of other parts of the eye:

1) Cornea: The sclerotic layer bulges out to form the cornea. it focuses light rays on the retina and protects the eye.

2) Conjunctiva: This is a thin membrane that covers the cornea permanently. It protects the eye and aids to admit light rays into the eye.

3) **Optic nerve:** This is found at the back of the sclerotic layer; it penetrates the choroid layer and retina at a spot called the blind spot. It transmits sensory impulse generated within the retina to the brain for interpretation.

CHOROID LAYER

This is a highly vascularized (rich in capillaries) and pigmented layer. The capillaries provide food and oxygen to the cells of the eye and the black pigmentation absorbs light rays to avoid reflection. This layer consists of other parts of the eye:

1) Iris: this is an extension of the choroid layer to form two muscle fibres that forms a pore(pupil). It controls the amount of light passing through the eye.

2) Pupil: this is the opening through the iris. It controls the amount of light entering the eye.

3) Ciliary muscle /Suspensory ligament: These muscles are formed by the choroid layer are they hold the lens in place to bring about proper accommodation of the eye.

NB: accommodation is the ability of the eye to focus near and distant objects on the retina. For near vision ligaments relax tension on lens to form a convex shape which reduces the focal length and for distant vision the opposite occurs.

4) Lens: This is a biconvex elastic structure held in place by the suspensory ligaments. It refracts light and enable adjustment of image to focus on the retina.

RETINA (INNERMOST LAYER OF THE EYE)

This layer is vascularized, pigmented and it consist of two types of sensory cells:

-Cones; These cells are sensitive to colour vision and lights of high intensities.

-Rods: These cells distinguish on black and white colours, they respond to light of all intensities.

Light rays focus on the retina and images are formed on the retina. The retina also detects the colours of objects. The retina consists of other parts which include:

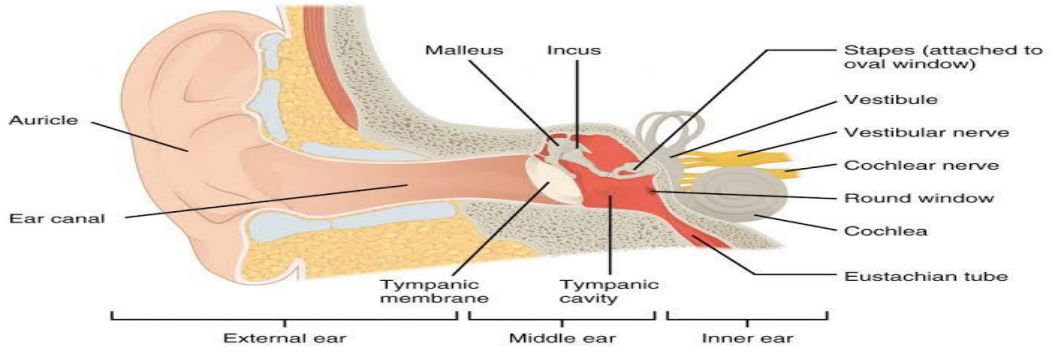
1) Yellow spot: This is the most sensitive part of the retina where the fullest visual information is sent to the brain.

2) Blind spot: This is the part of the retina that is not sensitive to light it marks the point where the optic nerve leaves the eye to the brain.

NB: two kinds of fluid are formed within the eye i.e. the aqueous humor (watery fluid between the cornea and the lens) and the vitreous humor (jelly-like fluid between the lens and the retina). The fluids help refract light rays and also maintain the spherical shape of the eye.

WEEK 6
Topic: Sense Organs 6
Sub-topic: The Ear
Specific Objectives: at the end of this lesson, students should be able to:
-describe the structure and function of the human ear as a sense organ.

The ear is the organ of hearing. The ear is divided into three regions namely: the outer ear, the middle ear and the inner ear/labyrinth.



THE STRUCTURE OF THE EAR

THE OUTER EAR: This part consists of the pinna, the auditory meatus and the tympanic membrane.

1) The Pinna: This is a soft cartilage layered with skin. It detects direction of sound waves, collect them and direct them into the auditory meatus.

2) The auditory meatus/Ear tube: This is a narrow passage which contain wax producing cells and fine hairs. It prevents the entry of insects, dust and germs.

3) The tympanic membrane/Ear drum: This is like a drum skin that vibrates when reached by sound waves. It transmits soundwaves from the outer ear to the middle ear.

THE MIDDLE EAR: This is an air-filled chamber found in the skull, it consist of three tiny bones called ear ossicles and the eustachian tube.

1) Ear ossicles : this consist of three bones held by muscles; The malleus/hammer (attached to the tympanic membrane), The stapes or stirrup(fits into a window opening called oval window which leads to the inner ear), The incus or anvil (connects the malleus and the stapes). They magnify and transmits vibrations from the tympanic membrane to the oval window.

NB: a round window is found beneath the oval window that leads to the inner ear.

2) Eustachian tube: This tube connects the middle ear to the pharynx and opens when we yawn. it permits air to enter the middle ear, hence equalizing air pressure on either side of the ear drum.

INNER EAR: This consist of a complex, bony fluid filled passage ways that form two sensory structures i.e. the cochlea and semicircular canals, utriculus and sacculus. The cochlea contains auditory nerves which receive vibrations and send impulses to the brain for interpretation. These enable hearing and maintenance of balance.

NB: the ear performs two major functions i.e hearing and maintenance of balance.

PROCESS OF HEARING

The pinna receives soundwaves, directs the sound wave through the ear canal (eardrum – ossicles) to the cochlea and the vibrations in the cochlea stimulate auditory nerves and impulses are sent to the brain for interpretation.

MAINTENANCE OF BALANCE

The fluid present in the semicircular canal are in right angles. Any head movement that moves the fluid triggers the auditory nerves and the brain make interpretations as regards the balance of the body.

WEEK 7

Topic: Sense Organs 7

Sub-topic: defects and corrections of the eye and ear.

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

Describe defects of the eye and ear.

Outline ways through which defects of the eye and ear can be corrected.

An impairment to the function of the eye or ear is termed a defect.

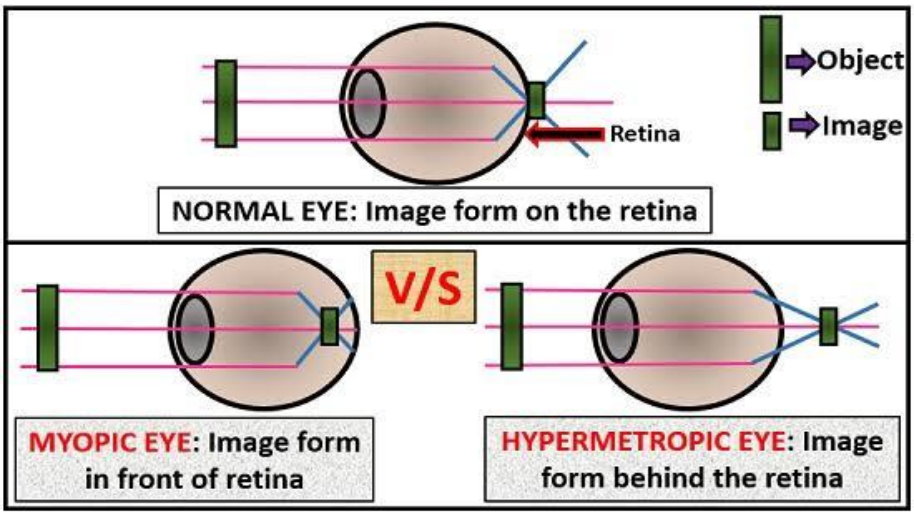
EYE DEFECTS

1) Short-sightedness (Myopia): This defect is caused by the eyeball being too long such that images of distant objects are formed before the retina, hence distant objects cannot be seen properly. This is caused by the lens being too convex. This defect can be corrected using a diverging or concave lens.

2) Long-sightedness (Hypermetropia): This defect is caused by the eyeball being to short such that images of near objects are formed or brought to focus behind the retina, hence objects placed near are not properly seen. This is caused by the lens being too concave or flat. It can be corrected using a suitable convex or converging lens.

3) Presbyopia: this the loss of elasticity of the lens and ciliary muscles which eventually result in the loss of accommodation. This defect can be corrected using a bi-focal lens i.e. combination of concave and convex lens.

4) Astigmatism: This is caused as a result of an unequal curvature of the cornea or lens which scatters light rays at different points in the retina. It can be corrected using cylindrical lenses.



EAR DEFECTS

1) Partial deafness: this is the inability of the ear to detect sound of normal loudness except when the sound is very loud. It can be corrected via the use of hearing aids(devices that amplify sound)

2) Total deafness: the inability of the ear to detect sound. There is no known correction for this condition.

WEEK 8

Topic: Metabolism in the human body 1

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

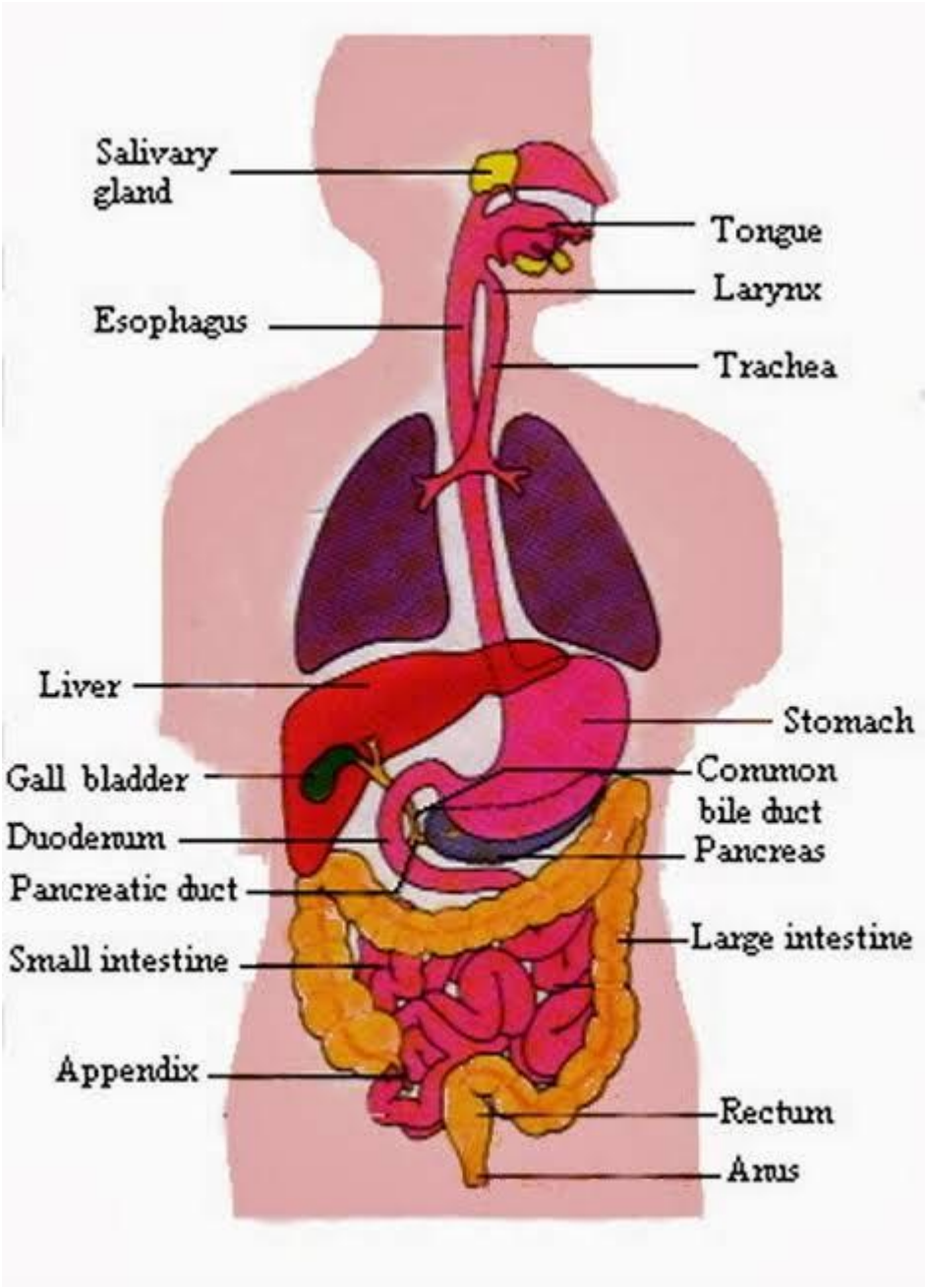
-define metabolism stating examples.

-explain the digestion and absorption of food nutrients in the body

Several chemical reactions occur within the body cells of living organisms. These biochemical reactions enable the organism to survive.

Metabolism in the human body refers to the biochemical reactions occurring within the body that sustains all our life processes. This reactions can be of two

type namely i.e. **anabolism** (which involves the build up of large molecules from smaller molecule and this requires energy in the form of ATP (adenosine triphosphate)e.g. formation of starch and glycogen from a simple sugar like glucose) and **catabolism**(which involves the breakdown of large molecules into simpler molecules, it is accompanied with the release of energy e.g. respiration, digestion). Metabolism is important because without metabolism we will be unable to obtain nutrients from food substance and we would be unable to store some important food nutrients that our life processes depends on.



DIGESTION AND ABSORPTION OF FOOD NUTRIENTS

When we ingest food substances, the food substance is broken down in simpler absorbable molecules that can enter the blood via the villi of the small intestine. The digestive system contains enzymes in different regions that successfully breaks down the food substances until they can be efficiently absorbed in the small intestine. The table below sequentially describes the process of digestion in the human body.

S/N	Region of the digestive system	Food substance digested	Enzyme	End product
1	Mouth	starch	Ptyalin/Amylase	maltose

2	stomach	protein	Pepsin	Polypeptides
3	Duodenum	Protein, lipids, starch	Trypsin(protein), Amylase(starch), Lipase(lipids)	Polypeptides (from proteins), Maltose (from starch), Fatty acids and glycerol (from lipids)
4	Small intestine	Polypeptides, Lipids, Maltose	Erepsin (polypeptides), Lipase (lipids), Maltase(maltose)	Amino acids(from protein), Fatty acids and glycerol(from lipids), glucose (from maltose)
NB: Enzymes are organic substances that speed up chemical reactions in living organisms.				

ABSORPTION: this is the process by which food nutrients are taken into the blood for transport to body cells. It occurs in the small intestine. Wher the food substances have been broken down to their simplest form i.e. amino acids from proteins, sugars from carbohydrates, fatty acids and glycerol from lipids. The small intestine is lined with fingerlike structures called the villi. The villi is a highly vascularized(i.e. rich in capillaries) and contains lacteal that leads to the lymphatic system.. The capillaries take up amino acids and sugars by means of diffusion into the blood, while fatty acids and glycerol are absorbed through the lacteal which eventually leads to the blood.

WEEK 9

Topic: Metabolism in the human body 2

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

-state the storage form of food nutrients in the body.

-describe some problems associated with the storage of food nutrients.

Digestion releases food nutrients into the blood stream. These nutrients perform different functions that are essential to the body, be it body building or energy production.

S/N	Food nutrients	Storage forms
1	Carbohydrates	Glycogen
2	Proteins	No storage form
3	Fats and oil	Fats/lipids

The table above shows the storage forms of food nutrients in the body. Carbohydrates when eaten is broken down to sugar (glucose) by digestion. Glucose is used by cells for energy but when in excess it is stored as glycogen in the liver and muscle cells. The conversion of glucose to glycogen for storage is facilitated by the presence of the insulin hormone secreted by the pancreas. Proteins are broken down to amino acids by digestion, but proteins have no storage form. These amino acids are deaminated in the liver and they produce ketoacids used in the production of energy and glucose. The lipid(fats) molecules are digested into fatty acids and glycerol which are transported into body cells via the lacteal in the villi of the small intestine. These fatty acids are used to provide energy when oxidized in cells just as glucose is oxidized during respiration. However excess fatty acids are combined with glycerol to form fats/lipids which are stored in adipose tissues. These adipose tissues can be found within the lower abdomen, buttocks and cheek. Vitamins have no storage forms just as lipids, some are stored in the liver.

PROBLEMS ASSOCIATED WITH STORAGE OF FOOD NUTRIENTS IN THE HUMAN BODY

1) Diabetes: This is a situation in which a human is unable to store excess glucose in the blood as glycogen. This is usually because of two reasons;
i) Inability of the pancreas to produce insulin (type one diabetes)
ii) insensitivity of the cells to insulin (type 2 diabetes).
2) Crohn's disease: This is a condition in which the digestive system is inflamed. It is also called inflammatory bowel disease (IBD). It is characterized by the following symptoms; diarrhea, stomach ache, blood in fecal waste, tiredness (resulting from inefficient digestion of food substances and adequate storage
3) Lactose intolerance: inability to digest lactose sugar which is usually present in milk and yoghourt. This causes the milk to be discharged via the large intestine which leads to the bloating of the stomach.
4) Malabsorption syndrome: this refers to the number of disorders in which the small intestine cant absorbs enough of certain nutrients.

WEEK 10
Topic: Soil

Specific Objectives: at the end of this lesson, I should be able to:
-define soil stating different soil types
-identify soil types suitable for cultivation of crops.
-differentiate soil types based on porosity/water holding capacity and capillarity.

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Soil is the uppermost layer of the earths crust which provides support and nutrient for plants growth and habitat for some animals. The soil is a complete mixture of mineral matter, humus, air and living organisms. Soil is classified based on the size of the particles present in it. Soil particles vary in size and chemical composition, depending on the types of rock from which they were formed and how they were weathered. Those soils with a high proportion of

sand are known as sandy soils; those with a high proportion of clay and silt are called clayey soils and those with nearly equal amount of sand, clay and silt are known as loamy soils. The proportions of these particles in the soil have an important effect on their properties and on the types of plants found on them.

TYPES OF SOIL

1. Sandy Soil: This contains 80% sand and gravel and 20% of the other types of particles taken together. Large coarse particles of sand and gravel predominate.

2. Clay Soil: This contains more of fine clay (60%) and silt particles.

3. Loamy Soil: This contains a mixture of both clay and sand with some humus in roughly equal proportion. Loamy soils are the most fertile and the humus in it gives it a mellow tilth i.e. the size of the soil particles and the air spaces between the particles are the most suitable for cultivation.

EFFECTS OF SOIL ON VEGETATION

Soil factors play an important role in determining the vegetation of a region. Soils account for the variation in type of plants that are found in regions with similar climates. To support a rich growth of plants, soil must have the following characteristic;
(i) A rich humus contents
(ii) A rich mineral content
(iii) A good water-holding capacity; this is determined by the amount of humus and clay in it.
(iv) Good soil porosity; determined by the humus, sand content and soil texture.
-Sandy soil is low in plant nutrient and so it supports scanty vegetation or grassland. Clay soil has a little more amount of plants nutrients than sandy soils and thus can support light vegetation such as shrubs. Loamy soil is very fertile and can support luxuriant vegetations such as a forest.

WATER HOLDING CAPACITY OF SOIL

Water holding capacity of soil refers to the ability of the soil to retain water. The amount of water retained by any soil depends on the size of the particles, the humus content, aeration, temperature and presence of microbes. Clay and humus retain a higher amount of the water than sand. In clay soil, most of the water is held firmly to the surface of the soil particles (**hygroscopic water**) and this is not usually available to plants. In sandy soil very little amount of water is

retained as most of it drains off. Loamy soil can retain more water within its particles. This is called **capillary water** and is available for plants use.

PRACTICAL GUIDE ON SOIL

1. Experiment to determine the water retaining capacity of soil types.

-Title of experiment: To compare the porosity and water holding capacity of three soil types

-**Materials required:** Three measuring cylinders of 100cm^3, cotton wool, three funnels, water, dry sand, dry clay, dry loam, stop clock, balance.

-**Method:** Stand the three funnels in the three measuring cylinders and block the funnels with cotton wool.

-Place an equal weight of dry sand, dry clay and dry loam in the three funnels respectively.

-Pour 50ml of water onto each sample at the same time and allow to drain.

-Allow the set up to stand for an hour or until the water has stopped dripping through each funnel.

-Read the level of water in the measuring cylinder.

-Calculations:

(a) Rate of drainage/porosity is calculated from the amount of water collected in the measuring cylinder. The more the water, the more porous the soil sample. Usually porosity is highest in sandy soil because it has large pore spaces and large particle sizes, followed by loamy soil and then clay soil which has the least drainage because of its tiny pore spaces and fine particles.

(b) Water holding/retaining capacity is calculated as follows;

Volume of water added to soil =50ml

Volume of water collected in cylinder =xml

Volume of water retained in the soil =(50 − x) ml

The percentage of water retained in each of the soil samples will be

(50 − x)/50 × 100= Y%

-Observation: It is observed that water drained out from the sandy soil faster than the loamy soil and finally the clay soil. It was also observed that clayey soil retained more water than loamy soil and least retained by the sandy soil.

-Conclusion: Sandy soil is more porous than loam which is more porous than clay. Clayey soil retained more water than the loamy soil and the sandy soil retained the least amount of water.

2. Experiment to Compare the Capillary Action of Soil Types

-Procedures:

-Take three wide glass tubes and plug each at one end with cotton wool.
-Nearly fill the tubes with the three soil samples separately.
-Clamp the tubes upright in a trough of water.
-Allow the set-up to remain for 3-6 hours
-Observe every 30mins.

-Observation: It will be observed that at the early stage of the rise of water in the three tubes, it was faster in sandy soil than the clay and loamy soil samples, however by the end of the experiment the water had risen to the highest levels in loam, followed by clay but remained at a low level in the sandy soil.

-Conclusion: Loamy and clayey soils have greater capillary actions due to their tiny pore spaces. The presence of organic matter in loam also enhanced its capillary. The sandy soil had poor capillary action because of its large pore spaces and large particles.

IMPORTANCE OF SOIL

1) Forms the platform for manmade structures.
2)Provides habitats for living organisms.
3)Food and other biomass production.
4)Provides man with building materials.
5)Act as filter for rainwater and may also prevent flooding**.**