PRIMARY SIX LESSON NOTES FOR TERM II 2018

THEME.THE WORLD OF LIVING THINGS (20 PERIODS)

TOPIC: CLASSIFICATION OF FLOWERING AND NON FLOWERING PLANTS

SUB TOPICS
Classification table of plant non flowering plants the structure of a plant Leaves flower stems roots seeds tropisms transpiration photosynthesis osmosis propagation germination pollination dispersal fruits leguminous and cereals importance of plants

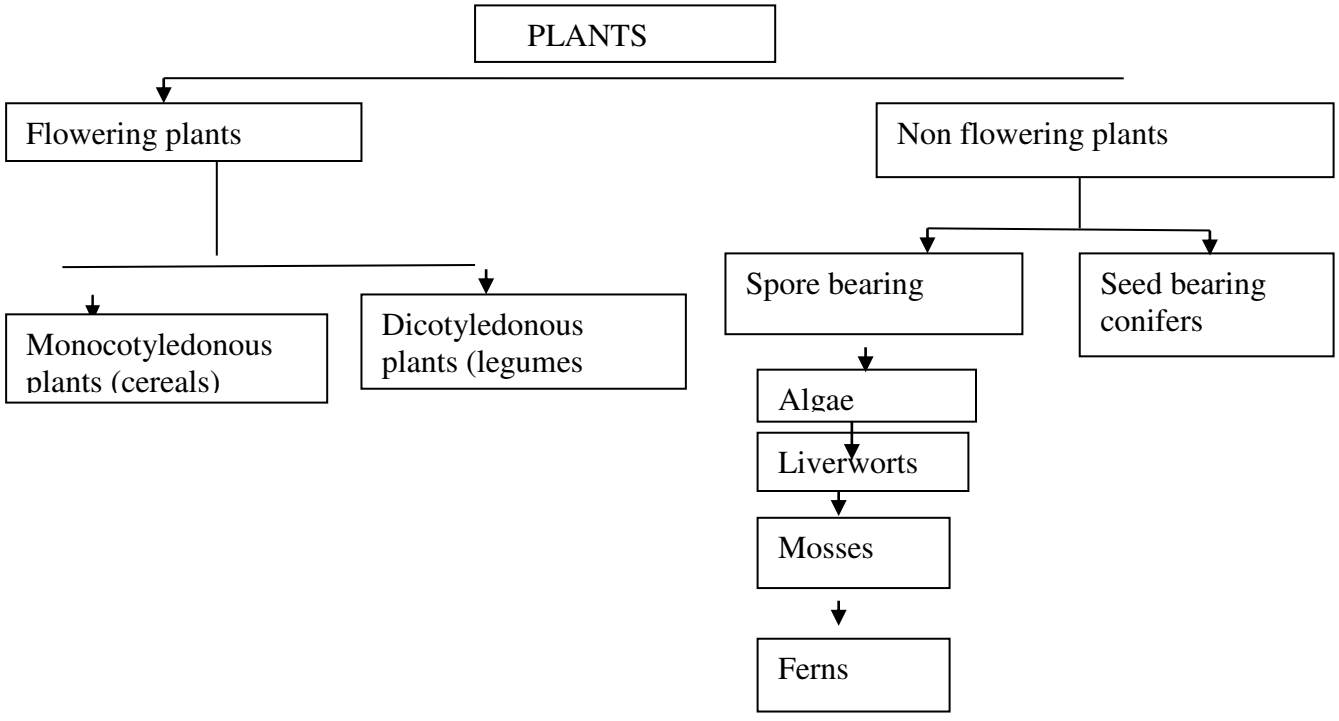
LEARNING OUT COMES- the learner acquires skills and knowledge of classifying plants.
-appreciates economic importance of plants

Vocabulary
Spores osmosis suckers algae tendril pollen grains lincens twinning water vapor mosses budding ferns grafting.

PLANT KINGDOM
Plants are divided into two groups viz:

i. Non flowering plants
ii. Flowering plants

CLASSIFICATION TABLE OF PLANTS



NON – FLOWERING PLANTS

These are plants which don't bear flowers. They commonly reproduce by means of spores. They are grouped into two main groups .ie

- Spore bearing plants
- Seed producing non flowering plants(Coniferous plants)

Spore bearing plants

These are plants that reproduce by means of spores. They bear their seeds in spore cases.
They include:

- Ferns
- Mosses
- Liverworts
- Horsetails
- Fungi
- Lichens

A spore is a single cell which is able to develop into a new plant. A spore is protected by a spore case.

FERNS

- Have chlorophyll and can make their own food.
- Have proper roots, stems and leaves.
- Reproduce by means of spores, spores are produced at the lower side of the leaves in spore cases.
- They grow in shady moist places.

Diagram

MOSSES

- These are small green plants grow on house roofs, verandah, tree trunks, logs, rocks, and soil in damp shady places.
- Reproduce by means of spores.
- Contain chlorophyll and makes its own food.

Diagram

LIVERWORTS

- Grow in wet moist places.

- Have chlorophyll and make their own food.
- Reproduce by means of spores.

Fung are the non green organisms that feed on decaying matter. So they feed saprophytically.
Examples are
Mushrooms
Toatdstools
Moulds
Puffballs
Some fungi are eaten as food eg mushrooms
Moulds are used to make peniciline drug that was discovered by Alexandar Fleming.
Some fungi cause fungal diseases and others like toadstools are poisonous so they kill when eaten.
The structure of a mushroom.

The gills produce spores
The hyphae /mycelium absorb water and dissolved mineral salts.
Amushroom is a good source of mineral salts

CONIFERS

- These bear seeds in structures called cones.
- Have small needle shaped green leaves.
- Don't have flowers but produce pollen and ovules in cones.

Examples include;

- Pine
- Cedar
- Fir
- Cypress
- Cycades
- Podo
- Ginkgo

<u>Economic value of conifers</u>

- Give us soft wood timber.
- Act as wind breaks.
- Produce soft wood for making papers, match sticks, ceiling boards.
- Earns foreign exchange.
- They are sold for income.

FLOWERING PLANTS

These are plants that bear flowers and reproduce by means of seeds.

Groups of flowering plants

- Monocotyledonous plants
- Dicotyledonous plants.

Monocotyledonous plants

These are plants that bear seeds with one cotyledon.

Examples

Millet	maize
Sorghum	rice
Barley	wheat
Oats	

Characteristics of monocotyledonous plant

- Produce seeds with one cotyledon
- They undergo hypogeal germination.
- Have fibrous roots.
- Have leaves with parallel leaf venation.

Dicotyledonous plants

These are plants which bear seeds with two cotyledons.

Examples:

Legumes e.g. beans, peas, groundnuts, bambara nuts e.t.c.

Characteristics of dicotyledonous plants

- Produce seeds with two cotyledons
- Undergo epigeal germination
- Have a network leaf venation
- Have a tap root system.

A flowering plant consists of two systems

i. Root systems
ii. Shoot system.

Parts of a flowering plant.

Diagram.

Functions of parts of a flowering plant.

Terminal bud – Growing tip of the plant.

Auxiliary bud – grows into branch, flower etc.

Node – Point on a stem where a leaf grows.

Internode:- The region between two nodes

Root cap:- Protects the tip of the tap root .(main root)

<u>ROOTS</u>

A part of a plant that grows in the soil. It develops from the radicle.

Functions of roots

- Absorb water and mineral salts from the soil.
- Hold the plant firmly in the soil.
- Some roots store food for the plant.
- Some roots help the plant to breathe.

Uses of roots to man

- Some are sold to get income.
- Some roots are sources of food.
- Some roots are used as herbal medicine.
- Some provide wood fuel.

ROOT SYSTEMS

These are two main root systems

i. Fibrous root system.
ii. Tap root system.

Diagrams

Types of roots

i. Prop roots

These give extra support to a plant such plants include;- maize, sorghum, etc.
Diagram

ii. Buttress roots
iii. Clasping roots
iv. Stilt roots
v. Breathing roots
vi. Storage roots e.g. carrots, cassava, sweet potatoes etc

With diagrams

OSMOSIS

This is a plant process where fluids (plant nutrients move from a region of low concentration through a semi-permeable membrane.
Osmosis mainly takes place in the root hairs of plants.

An experiment to illustrate osmosis.

STEMS

Functions of the stem to plants.

- They hold leaves and branches in position to get sunlight.
- Hold the flower for pollination
- Help in transpiration
- Some stems make food for the plant.

Functions to man.

- Some are sources of food.
- Some are sources of income.
- Some provide herbal medicine.
- Some are used for propagation.
- Some provide timber.

Types of stems

- Upright stems.
- Creeping stems
- Underground stems.

With diagrams

Reasons why plants climb others.

- To get support
- To obtain sunlight.

Ways how plants climb others

- Use of tendrils
- Use of hooks
- By twining or clasping

Underground stems

Examples are:

- Bulbs
- Rhizomes
- Stem tubers
- Corms

Bulbs
Examples are;
Onions, garlic etc
diagram of onion

Rhizomes
Examples are: turmeric, ginger etc

Stem tubers
Examples are; Irish potato, white yams etc

Corms
Example is cocoyam

Plant stem propagation
This is the way plants can be grown using stems.

Examples
- Bulbs
- Rhizomes
- Corns
- Stem tubers
- Suckers

With diagrams

LEAVES
The structure of a leaf , parts and their functions.
Types of leaves.
- Simple leaves
- Simple serrated
- Simple divided
- Simple lobed.

With diagrams

Compound leaves
- Bipinnate
- Pinnate

- Digitate
- Trifoliate

With diagrams
Functions of leaves to both plants and man (animals)

PHOTOSYNTHESIS
The process by which green plants make their own food.
Photo – means light.
Synthesis – means to build up.

Raw materials for photosynthesis
- Water
- Carbondioxide.

Conditions necessary for photosynthesis
- Chlorophyll
- Water
- Sunlight
- Carbondioxide.

Importance of Photosynthesis
- It helps in food production
- It helps to purify the environment by using atmospheric carbondioxide

Adaptations of leaves for photosynthesis
- Have a broad flat shape to increase surface area for sunlight.
- Have thin walls to allow carbondioxide
- Have stomata for gaseous exchange.
- Have veins for translocation.

TRANSPIRATION
The process by which plants lose water as water vapour to the atmosphere though leaves.
An experiment to show transpiration.

Importance of transpiration
- To cool the plant.
- Helps plants to absorbs water and mineral salts.
- Helps in rain formation

Factors affecting rate of transpiration
- Temperature
- Light intensity
- Wind
- Nature of the leaf

- Humidity
- Stomata

Ways of reducing transpiration

- Plants shed their leaves
- Forming a layer of wax on the leaf surface.
- Reducing the size of leaves to thorns.

REPRODUCTION IN FLOWERING PLANTS

There are two types of reproduction in plants.
Asexual reproduction (Vegetative propagation)
Sexual reproduction.

THE FLOWER

The structure of a flower (Its parts and functions)

POLLINATION

The transfer of pollen grains from anthers to the stigma.

Types of pollination

- Cross pollination
- Self pollination

SELF POLLINATION

The transfer of pollen grains from anthers to the stigma of the same flower.

NB: A paw paw undergoes self pollination.
Diagram

Cross pollination:

The transfer of pollen grains from the anther of one flower to the stigma of another flower of the same kind..

NB: A maize plant undergoes cross pollination
Diagram

Agents of pollination

- Animals
- Wind

- Flowing water

Characteristics of insect and wind pollinated flowers

Wind	Insects
Have no nectar	Have nectar
Dull coloured petals	Bright petals
A lot of pollen grains	Few pollen grains
Have no scent	Have scent

Importances of pollination

- It allows fertilization to take place in crops
- Leads to high yields in farmers harvest.

Uses of flowers

- For decoration on various functions
- Making of insecticide
- Perfume making
- Used to get dyes
- Sources of income by growing / selling
- Sign of love.
- Sign of respect for the dead.

FERTILISATION

The union of a male and female gamates to form a zygote.
After pollination, pollen tubes develop reaching down the ovules.
After fertlisation in the ovary, ovules become seeds and an ovary develops into a fruit.

Diagram

SEEDS

A seed is a fertilised ovule that develops into a new plant.

Classes of seeds

- Monocotyledonous seeds
- Dicotyledonous seeds

Monocotyledonous seeds

These have one coytledon.
Examples

Dicotyledonous seeds

These are seeds with two cotyledons.
Examples

Structure of abean seed

GERMINATION

The development of a seed into a seedling.

Types of germination

- Epigeal germination
- Hypogeal germination

EPIGEAL GERMINATION

The type of germination where the cotyledons come above the ground level. It occurs in all legumes. E.g. beans, peas, G.nuts, etc.

HYPOGEAL GERMINATION

This is the type opf germination where the cootyedons remain below the ground level. It occurs in all monocotyledonous plants e.g wheat, maize, sorghum etc.

Diagrams

Conditions necessary for germination

- Air (oxygen)
- Water (moisture)
- Warmth

Difference between dicots and monot plants

MONOCOT	DICOT
Have one cotyledon	Have two cotyledons
Have fibrous root system	Have taproot systems
Have parallel leaf venation	Have network leaf venation
Undergoes hypogeal germination	Undergoes epigeal germination
	Forms true wood.

FRUITS

A fruit is a developed ovary containing seeds. Fruits have two scars. Style stalk and stalk scar. Fruits protect seeds and assist in dispersal.

Types of fruits

- Succuent fruits
- Dry fruits

SUCCULENT FRUITS / JUICY FRUITS

These are fruits whose pericarp and mesocarp become juicy and fleshy and can be eaten. They are divided into three groups.

- Berries
- Drupes
- Pomes.

Berries

These are fruits with many seeds. The soft pericarp is divided into three layers.

- Epicarp
- Mesocarp
- Endocarp

Examples

- Oranges
- Tomatoes
- Pawpaw

Diagram of an orange fruit.

Drupes

These are fruits wih one seed inside a hard endocarp. Drupes have three layers;

- Epicarp
- Mesocarp
- Endocarp

Examples

- Mangoes
- Avacadoes
- Coconuts
- Palm oil
- Cashew nuts.

etc

Diagrams

Pomes

These are fruits in which the receptacle becomes juicy and modified as a fruit while the inner core is the pericarp.

Examples

- Apples
- Figs

- Pears etc

Diagram

FRUIT AND SEED DISPERSAL

This is the scattering of seeds and fruits from parent plants to a new environment.

Importance of seed dispersal

- Prevents over crowding
- Reduces competition for light and nutrients.
- Enables plants to colonise new areas.
- The farmer gets new species of crops.

Agents of seed dispersal

- Water
- Animals
- Wind
- Explosive mechanism

Explain the characteristics of each and their diagrams.

TROPISM

Tropism is growth movement of plants in response to a stimulus
A stimulus is any change in the environment which the plant is sensitive to

Kinds of tropism

Phototropism
This is growth movement of plants towards light eg when a plant is placed in the dark box with a small opening towards the plant tends to grow

Diagram

Geotropism

This is a growth movement of a plant towards the direct of force of gravity plant root grow wards due to force of gravity.

Diagram for illustration

Hydrotropism
This is a growth movement of some parts of certain plant in response to touch one side. This stimulus helps twinning plants such as beans , passion fruits and yams climbs by use of tendrils , hooks

Chemotropism
This is the growth movement of plant parts towards the source of chemical eg pollen tubes grow the style to reach the ovules

PLANT PROPAGATION
Plant propagation refers methods used in growing crops
There are two basic methods of propagation

i) Seed propagation
ii) Vegetative propagation

SEED PROPAGATION
most flowering plants are propagated by means of seeds eg beans , maize, coffee , mango etc
vegetative propagation
in this method a part of a parent plant is planted to give rise to a new plant.

Parts if plants used in vegetative propagation are :-
- Stems
- Leaves
- Buds

Types of vegetative propagation
- Natural vegetative propagation
- Artificial vegetative propagation

Natural vegetative propagation

Plants	Methods of propagation
Yams (white yams)	Stem tubers
Irish potatoes	Stem tubers
Ginger	Rhizomes
Banana , pineapple, sisal	Suckers
Pineapples	Crowns , slip
sisal	Bulbils
Onions	Bulbs
Straw berry	Runners
Pyrethrum	Split

Artificial vegetative propagation

This involves use of special skill and techniques to produce high quality and high yielding crops which are resistant to diseases

Example of artificial vegetative propagation

a) Stem cutting
Description & Diagram

b) Layering
Description & Diagram

c) Grafting
Description & Diagram

d) Budding
Description & Diagram

e) Marcotting
Description & Diagram

ECONOMIC VALUES OF PLANTS TO MAN

- Plants provide food to man.
- Plants help in controlling soil erosion
- Plants are needed in construction and building industry.
- They provide raw materials for agro based industries
- Agricultural industry is a source of revenue for government

ANIMAL HUSBANDRY

Animal husbandry is the care and management of livestock (farm animals)
Examples of farm animals include; goats, rabbits, pigs, sheep, cattle, poultry.

KEEPING CATTLE

This is the rearing of cows, bulls, oxen, heifers and bullocks.

<u>Why farmers rear cattle</u>

- For meat and milk production

- To get income
- For provision of labour
- For payment of dowry and bride price

Importance of keeping cattle
- They provide us with meat and milk
- They are a source of employment to farmers
- Bulls and oxen are used for ploughing and transport
- Cow dung is a source of manure
- Hides from cattle are used to make leather
- Bones, horns and hooves are used to make glue and animal feeds.
- Cattle are used to pay dowry or bride price.

External parts of a cow

Types of cattle

A type of cattle means a class of cattle kept for a specific purpose.
The major types of cattle kept in Uganda include;
- Beef Cattle
- Dairy Cattle
- Dual purpose Cattle

Types of breeds of cattle

A breed is a family of cattle having specific characteristics. The type of breed of cattle are determined by; colour, size, milk yield, body conformation like shape etc.
There are three types of breeds of cattle , namely;
- Local breeds/indigenous breeds
- Exotic breeds
- Cross breeds

Local or indigenous breeds

These are breeds that have existed in East Africa for long. They are also called Native Breeds.
Examples
- Ankole cow
- Boran
- Zebu

Advantages of local breeds of cattle
- They are resistant to some diseases.
- They can survive on poor pasture and little water
- They require less care and management

- They produce high quality meat and milk
- Disadvantages of local breeds of cattle
- They mature slowly
- They produce less products (i.e. Milk and meat)

Advantages of exotic breeds of cattle
- They grow and mature faster
- They produce more meat and milk

Disadvantages of exotic breeds of cattle
- They are easily attacked by diseases
- They need good pasture and water all the time.
- They need a lot of care and attention.

Types of cattle
There are three types of cattle namely;
- Beef cattle
- Dairy cattle
- Dual purpose cattle
- Work type (draught cattle)

Beef cattle
These are cattle mainly kept for beef (meat) production.

Characteristics of beef cattle
- They grow fast
- They have a block (rectangular) shape
- They have small heads
- They have short legs with long broad backs.

Examples of beef cattle
- Short horn
- Galloway
- Hereford
- Aberdeen angus
- American Braham
- Charolais
- Santa Gertrudis

Diagram of a beef cattle as seen from above and aside.

Seen from aside Seen from above

Dairy cattle
These are cattle kept mainly for milk production

Characteristics of dairy cattle
- They are triangular in shape
- They produce a lot of milk
- They have well set legs to support their weight.
- They have plenty of space between their hind legs.
- They are usually docile (calm)
- They have small necks and wide hind quarters.

Examples of dairy cattle
a) Friesian b) Brown Swiss
c) Guernsey d) Ayrshire

Diagram of a dairy cow as seen from above and aside

Seen from above Seen from aside

Dual purpose cattle
These are cattle kept for both meat and milk production.

Examples
1.Red Poll 2. Milking Short horn
3. Sahiwal

Work (draught) cattle
These are cattle mainly kept for providing labour on a farm (ploughing, transport).

They are used to plough soil, pull carts, etc.

Differences between local and exotic breeds of cattle

Local Breeds	Exotic Breeds
They have different colours	They have specific colours.
They mature slowly.	They mature quickly.
They produce less meat and milk.	They produce more meat and milk.
They need less care.	They need a lot of care.
They are more resistant to diseases.	The are less resistant to diseases.
They can survive on poor pasture and water.	They need good pasture and water all the time.

Breeding of cattle

Breeding is the keeping (maintaining) of inherited characteristics in cattle. Such characteristics include; colour, growth, disease resistance, milking, longevity, (ability to love long).

Types of breeding

1.In Breeding
2. Line breeding
3. Out Breeding
4. Cross breeding
5. Up grading
6. Selective breeding

In Breeding

This is the mating of very closely related animals (such as brothers and sisters).

Advantages of in breeding

It makes good characteristics in the family of animals strong.

Disadvantages

It leads to production of poor quality.
It can lead to inheritance of bad traits.

Line Breeding

This is the mating of closely related animals (such as cousins).
Line breeding can lead to inheritance of bad traits.

Out Breeding

This is the mating of distantly related animals.
Out breeding brings good qualities that may be disappearing in a breed.

Cross Breeding

This is the mating of unrelated animals of different pure breeds. (e.g. Mating exotic breeds with local breeds).
The off springs after cross breeding are called cross breeds.
Cross breeds have better performance than their parents or relatives.

Up Grading
This is the improvement of quality of one breed by using a breed of superior quality several times.

Selective Breeding
This is the mating of selected good breeds in a herd.
Bad or poor breeds in a herd are sold off for slaughter.

Types of service/insemination
There are two types of insemination;

a) Natural Insemination
b) Artificial Insemination

Nature Insemination
This is the depositing of sperms into the female reproductive system by a male animal.

Types of natural insemination

a) Hand mating
b) Pasture mating

Hand mating
This means bringing a bull to mate with a cow on heat.

Pasture Mating
This means allowing a bull to move with cows so that it mates easily with those on heat.

Advantages of natural insemination

- A farmer does not bother to look for an expert inseminator.
- It is cheap for a farmer since semen is not bought.
- The bull notices the cows on heat easily.
- Animals on heat enjoy the feeling of sex.

Disadvantages of natural insemination

- Controlling veneral diseases is difficult.
- Small cows can be injured by big bulls.
- Transporting a bull if non is around is expensive.
- Inbreeding is easily practiced.

Reproduction in cattle
Reproduction is the ability to produce off springs and increase in number.
There must be a male and a female to mate and produce young ones.

Mating
Mating is the sexual union of the male and female animals.
During mating, serving (insemination) takes place.
A heifer is ready for mating at the age of 18 months.
When a cow or heifer is ready for mating, it shows signs of heat.

Heat period or oestrus period
This is the time when a female animal is ready to mate with a male animal.

Oestrus cycle
This is a period when a female animal can conceive if it mates.
Signs of heat
- The cow mounts other cows.
- The cow allows other cows to mount it.
- The cow loses appetite to graze.
- Mucus discharge from the vulva.
- Slight rise in the body temperature of a cow.
- The vulva swells and changes from pink to red.
- The cow urinates frequently.
- The cow becomes restless and moos all the time.
- Milk production in lactating cow drops.
- Three weeks after the period of service, if the cow shows no more signs of heat, we say it has conceived.

Artificial insemination
This means depositing sperms into the female reproductive system of a cow using s syringe or an inseminating gun.

Advantages of artificial insemination
- It controls veneral diseases.
- It is cheaper to buy sperms than buying a bull.
- It prevents injury to small cows.
- Semen from a good dead bull can be used to improve breeds.
- In breeding is controlled.
- Wastages of semen is minimized

Disadvantages of artificial insemination
- It requires an expert to carry it out.
- Storing semen is difficult.
- It may not give good results.
- A farmer may not easily notice the cow on heat.

The reproductive system of a cow.
Diagram

Uses of each part
Vulva
It receives and guides the penis to the vagina.
It protects and covers the vagina.
Vagina
It receives sperms and passes them to the uterus.
It is a birth canal.

Cervix
It protects the foetus during pregnancy by closing the cervix.

Ovary
It produces mature ova (eggs)
It produces hormones which controls the sexual cycle.

Ova
These are female reproductive cells. They fuse with sperms to form a zygote.

Uterus
It is where implantation takes place.
It provides a suitable environment for implantation to take place.
Oviduct (fallopian tube)
It is where fertilization takes place.
It passes a fertilized egg to the uterus.

The reproductive system of a bull
Uses of each part
- Testes
- They produce sperms.
- They produce a hormone responsible for puberty and sexual desire. This hormone is called testosterone.

Urethra
It passes urine to the penis
It passes sperms to the penis.

Sperm ducts
They carry sperms to the urethra.

Penis
It deposits sperms to the vagina

Testes

They help to manufacture sperms

Epididymis
It stores sperms.

Prostate glands and seminal vesicles
They produce semen through which sperms swim.

Scrotum
This is the outer covering of the testicles.
It protects the testicles.
It regulates the temperature of the testicles.
Fertilization in a cow
Fertilization is the union of male and female gametes to form a zygote.
A gamete is a reproductive cell.
The female gamete is called Ovum
The male gamete is called a Sperm.

Diagram of a sperm and an Ovum

Sperm Ovum

After fertilization, the zygote develops into an embryo.
The embryo develops into a foetus and finally into a calf.

Zygote ⟶ Embryo ⟶ Foetus ⟶ Calf

The embryo is attached to the uterus wall through the placenta.

Implantation
This is the attachment of the foetus to the walls of the uterus.
Therefore, Implantation takes place in the uterus.

Gestation period
This is the time between conception and giving birth.
The gestation period of an in-calf is 270-280 days or nine months.
An in-calf is a cow that is pregnant.

Signs of pregnancy
A cow does not go on heat 21 days after service.
- The uterus enlarges in the second and third month after conception.
- The udder enlarges and fills with milk.
- The cervix closes during pregnancy.
- The movement of foetus can be seen or felt after 7 months.

<u>Dry period</u>

This is the time when a lactating cow is left without milking it in preparation to giving birth.
A cow is dried six to seven weeks before calving.
During the dry period, the in-calf is fed on foods rich in protein.

Steaming up
This is the feeding of an in-calf on foods rich in protein. It is normally done during the last two months.

Why steaming up/advantages of steaming up
- It encourages the foetus to grow healthy.
- It builds a cow's body in preparation for calving (parturition)
- It increases the manufacture of colostrum.
- It prevents low birth weight.
- It prolongs milk let down.

Calving or parturition
This is the act of giving birth in cattle (cows).

Signs of calving
- The vulva swells and becomes red.
- The cow lies down most of the time.
- The udder and teats become swollen.
- The amnion (or water sac) comes out and it bursts.

Colostrum
This is the first yellowish milk got from a cow which has just given birth.

Uses of colostrum
- It has all food values.
- It opens up the digestive system of a calf.
- It boosts the immunity of a calf since it is rich in antibodies.
- It improves a calf's sight since it is rich in vitamin A.

Cattle management on a farm
There are various ways of cattle management on a farm. These include;

1. Numbering	2. Dehorning/Disbudding
3. Hoof trimming	4. Castration
5. Dehorning	6. Spraying
7. Dipping	8. Dusting

Numbering
This means putting a mark or label on the body of animals.
Numbering enables farmers to identify animals easily.

Ways of numbering

a) Branding
b) Ear Notching
c) Ear tagging
d) Number lacing
e) Ear tattooing
f) Tail Bobbing
g) Grueling

Ear notching
This is the cutting of the edge of the ears of animals with marks.

Diagram

Ear Tagging
This means fixing tags with numbers on the ear of animals.

Diagram

Numbering lacing
This is the putting of a wooden o iron piece of plate around the neck of animals.

Diagram

Ear tattooing
This means putting permanent mark on the ears of animals using pliers carrying numbers on them.

Diagram

Tail bobbing
This means trimming long hair on the animals' tail (switch).

N:B Cows are not usually docked i.e. tails are not shortened.

Grueling
This means trimming long hair around the anus and genital parts.

Dehorning /disbudding
This is the removal of horn buds from the calf's head.

Materials used for dehorning
i) Dehorning iron
ii) Chemicals such as caustic sticks.

Advantages of dehorning
- It makes animals easy to handle.
- It reduces the risks of injuries among animals and people.
- It increases space in the Kraal/Many animals can be kept in a small space.
- Hoof trimming
- This means cutting off over grown hooves of animals.

Advantages
It reduces the risk of injuries among cattle.
It reduces the risk of transmission of diseases.

Castration
This is the removal of testicles from a male animal.

Methods of castration
There are three methods of castration;
i) Open Operation (open castration or Surgery)
ii) Closed operation (closed castration)
iii) Use of a loop (Rubber ring)

Open operation
This is the removal of testicle from a male animal by using a sharp knife or blade to slit the scrotum.

Diagram

Closed operation
This is the crushing of sperm ducts by using a burdizzo which has blunt pincers.

Diagram of a burndizzo

Uses of a loop

- This means squeezing sperm ducts using an elastic rubber band.
- When the sperm ducts, (spermatic cords) and blood vessels are broken, the testes shrink and die.

Diagram

Advantages of castration

- It prevents the spread of STDs among cattle.
- Castrated animals become humble (docile) and easy to handle.
- Castrated animals fattens for more beef.
- Castrated animals graze with females without disturbing them.
- It prevents inbreeding
- It prevents poor breeds since bulls with poor breeds are castrated..

Disadvantages of castration

Castrated animals may lose a lot of blood and die.
Wounds may become septic and cause pain and death.
Animals are denied the right of mating.

Deworming

This means giving drugs to domestic animals and birds.

Why deworm?

To remove endo parasites from the body.
Methods of deworming

1. Drenching
2. Dozing

Drenching

This means giving liquid medicine to animals.
Drenching can be done using a drenching gun or a bottle.

Diagram of a drenching gun

Dozing

This means giving solid medicine to cattle (animals)
The solid medicine is in form of tablets or capsules.

Spraying
This is the removal of ecto parasites on the body of an animal by sprinkling acaricides using a knapsack sprayer or spray race.

Dusting
This means applying the body of animals with powdered chemicals to kill ecto parasites.

Deticking
This is the picking of ticks from the skin of animals using hands.

Dipping
This means making animals to swim through water mixed with acaricides in a dip tank/pool.

Diagram of a dip tank

Removal of extra teats
This means cutting extra teats from the udder of a cow. There should be only four teats.

MILKING
This is the removal of milk from the udder of a cow through teats.

Milk let down
Milk let down is the flow of milk from the udder of a cow.

Types of milking
There are two types of milking namely;

a) hand milking
b) Machine Milking

Hand milking
Hand milking is the drawing of milk from the udder of a cow by squeezing teats using hands.
Hand milking is also called full hand milking.

Machine milking
This is the use of a machine to draw milk from the udder of a cow.
The parts of a milking machine must be washed to avoid milk contamination.

Diagram illustrating machine milking

Preparation for milking

- Assemble the milking equipment.
- Clean all the milking equipment to make them in good working order.
- Put the cow in a milking place and tie the hind legs with a rope.
- Give the cow some feeds to keep it busy and relaxed during milking.
- Wash the udder and teats to encourage milk let down.
- Wash your hands clean.
- From each teat, draw one or two streams of milk through a strip cup to detect the presence of mastitis in milk.
- If the cow has mastitis, blood stains will be seen in milk drawn through a strip cup.
- A cow with mastitis should be milked last.
- After milking, wash the milking place and equipment using disinfectants.

STRIP CUP

This is an instrument used to detect the presence of mastitis in milk.

Diagram of a strip cup

LACTOMETER

This is an equipment used to;

a) detect the presence of water if added in milk
b) detect the presence of fats in milk.

A lactometer is a closed weighed tube graduated to make the level of normal milk.

How a lactometer works

- A lactometer is dipped in a container having milk.
- If water has been added to milk or fats have been removed, it will not get enough support to float and therefore it will sink deeper.

Diagram of a lactometer.

Preserving milk

Milk is a good environment for bacteria to multiply.
It should therefore be preserved for future use otherwise it will go bad.

Methods of preserving milk

1. Sterilization	2. Refrigeration
3. Boiling	4.

Sterilization /pasteurization

- This means killing germs in milk by maximum boiling followed by cooling and boiling.
- It is also called pasteurization.
- The heating kills germs and quick cooling prevents bacteria from entering milk and multiplying in it.
- This method was named after Louis Pasteur, a French Scientist who discovered that milk goes bad because of bacteria.

Refrigeration

This means putting milk in a refrigerator where germs can't easily and quickly multiply because of very low temperature.

Boiling

This means killing germs by boiling milk from time to time.

Homogenizing

This is a way of treating milk so that fats are broken and then cream is mixed with the rest.
Homogenizing is not a way of preserving milk.

Products from milk

Butter	Cheese	cream
Ghee	Yoghurt	

CASEIN AND WHEY

This is the part left after butter has been removed from milk.
Casein can be used as a raw material for making shinny paper.

Whey

This is the liquid part left after sour milk has formed curd.
Whey can be used as a source to accompany food.

Examples of processed milk

Whole milk	Skimmed Milk
Pasteurized Milk	Fortified Milk
Condensed Milk	

HOUSING ON A FARM

Uses of housing on a farm

- Houses keep farm produce

- Houses keep farm records.
- Houses store animal feeds, utensils and farm tools farm (equipment)
- Houses are used as milking shades for animals.
- Houses are used as treating places for animals.

Types of houses on a farm
There are two types of houses on a farm. These are;
a) Semi-Permanent houses
b) Permanent houses

Semi-Permanent houses
These are houses made from simple local materials, (mud, reeds, cow dung, grass, poles, nails)
Examples include; Kraals and byres.

Permanent Houses
These are made from strong durable materials such as timber, bricks, concrete, iron sheets.

Roofing houses on a farm
Roofing farm houses depends on available materials.
The cheapest form of roofing is using grass, banana fibres, bamboo or straws.

Advantages of thatching
- It protects animals from bad weather.
- It prevents water from entering the house.
- It is cheap in construction.

Disadvantages of thatching using grass
- Thatching materials can easily catch fire and burn animals.
- Materials can easily rot.
- Thatch can easily leak if not well done.

FENCING
A fence is a barrier of live or dead materials used to divide land into plots or paddocks.
Fencing means putting a barrier of live or dead materials on land to divide or separate it into sizeable pieces.

Types of fences
- Natural fences (live Fences)
- Artificial fences (dead fences)

Natural Fences
These are planted plants along boarders (margins) of land to be fenced.
Examples of plants used to make natural fences include; bamboo, sisal, cypress, conifers, hedges, thorny plants, tatropa, cedar (x-mas tree)

Artificial fences

These are fences made out of dead materials
Examples of materials used include; chain links, barbed wire, wire nets, concrete, bricks, treated poles, nails.

Importance of fencing

- Natural fences act as wind breaks.
- Natural fences maintain soil fertility by adding humus.
- Fencing controls the spread of diseases by controlling animal movements.
- Fencing allows proper use of pasture.
- Fences keep off intruders such as thieves and wild animals.
- Fences prevent the straying of animals.
- Fences make culling easy.
- Fences make separation of animals according to age, sex, type, size and health easy.

PASTURE

Pasture is an open grassland on which animals graze.

Types of pasture
There are mainly two types of pasture, namely;

a) Natural pasture
b) Prepared Pasture

Natural pasture

This is pasture that grows by itself. It is eaten by animals in its raw form.

Examples of natural pasture.

a) Kikuyu grass
b) Guinea grass
c) Nandi grass
d) Elephant grass
e) Guatamala grass
f) Alfa alfa

Prepared pasture

This is pasture made out of fodder crops.
Fodder crops are crops grown for feeding animals.

Examples of prepared pasture

- Silage
- Hay
- Cloves
- Millet crops
- Desmodium

Importance of pasture

- Pasture is used for feeding animals

- Pasture adds humus to the soil.
- It provides bedding materials for animals
- It provides thatching materials for houses
- Leguminous pastures fix nitrogen in the soil.

The digestive system of a cow
Uses of each part
Mouth
For chewing food by the action of the teeth.
It passes food to the gullet.

Gullet
It passes food to the rumen

Rumen (pouch)
To store food temporarily before it is returned to the mouth for chewing.
It is where food is fermented
It is the largest of the four stomachs
Reticulum (honey comb)
Bacterial action continues here. Foreign bodies are retained here.
Omasum
It churns and grinds food into fine particles
Water is absorbed here also.

Abomasum (true stomach)
Digestion by enzymes takes place here.
NB; from abomasum to the rectum, digestion is the same as in non ruminants.

Types of food stuffs
Roughages
Concentrates
Additives

Roughages
They include hay (dried grass), silages (preserved green pasture), green grass, pasture, legumes, straws, maize stalks.

Concentrates
These include cereals, oily seeds and legumes.

Supplements
These include proteins and vitamins added to feeds.

Additives
These are drugs, flavours and hormones added to feeds.

Note:
Maintenance rations
These are feeds given to animals to sustain their usual feeds.

Production rations
These are extra feeds given to animals for production of either beef or milk.

Salt supply
Animals are given salt in order to;

a) stimulate milk production
b) control some diseases such as milk fever.

Intake
This is the amount of food eaten by an animal.

CATTLE PRODUCTS

- Meat
- Fats
- Hides
- Bones
- Cattle dung and urine
- Milk
- Horns and hooves

GRAZING
Grazing is the proper use of grass land by animals

- Systems of grazing
- Herding/free range/open grazing
- Rotational grazing
- Zero grazing

HERDING
This means looking after animals as they graze by a herdsman. The herdsman guides animals to good pasture and water.

Advantages of herding

- Animals eat a variety of feeds.
- Manure is evenly distributed on the farm.
- Animals are not easily stolen because they are easily and closely watched by a herdsman.

Disadvantages

- Animals can easily get diseases and parasites
- Animals may stray and destroy crops.
- Animals are likely to starve if the land is small.

- Animals are likely to overgraze the pasture.

ROTATIONAL GRAZING

This is a method of grazing in which animals graze on one portion of pasture at a time. There are three methods of rotational grazing;

i) Paddocking
ii) Strip grazing
iii) Tethering

Paddock grazing

- This means grazing animals on small fenced plots.
- The small fenced plots are called paddocks.
- The animals are allowed to graze in one paddock for a few weeks before they are moved to another paddock.

Illustration of paddock grazing

Drinking water for animals is found in paddocks.

<u>Advantages of paddock grazing</u>

- Paddock grazing allows proper use of pasture.
- It gives the farmer time to do other activities.
- Manure is evenly distributed on the farm.
- Paddocks break the life cycle of ticks.
- It gives grass time to grow back.
- It controls over grazing.

Disadvantages

Fencing paddocks is expensive
Paddocking requires a big piece of land.

STRIP GRAZING

This means grazing animals on small plots separated by a temporary wire.
The wire sometimes carries small(low) current (electricity) that controls the movement of animals in selected pasture areas (strips).
Animals graze in one strip at a time until they have gone through the pasture and back to the first strip.

Illustration of strip grazing

Advantages of strip grazing

- Pasture is well used.
- Parasites and diseases are easily controlled
- It requires less labour

Disadvantages

Maintaining strips is expensive (costly)
It is only suitable for few animals.

TETHERING

This is the tying of animals to a peg or tree using a rope.
The animals tethered can be moved to a new place when necessary.

Advantages of tethering

- It is cheap to maintain
- It does not require much attention
- Animals do not easily destroy corps
- Animals do not get astray.

Disadvantages

- Animals lack body exercises
- Animals may be restricted on one type of grass.
- Ropes may easily strangle animals
- Replacing ropes during the rainy season is costly.
- It is suitable for few animals.
- Animals may be easily stolen
- Animals may be easily killed by wild animals.

ZERO GRAZING

This means keeping animals in a special built structure.
Water and food are provided to animals.

Requirements for zero grazing

- A well constructed shade
- A store
- A feeding trough
- A water trough
- Workers
- Garden where fodders is grown
- Chaff cutter for cutting fodder crops.

Illustration showing zero grazing

Advantages of zero grazing

- Feeds are well used.
- Collecting manure is easy
- Sick animals are easily identified and culled
- Many animals are kept in a small area.
- Animals have less chances of getting diseases.
- Animals grow fat and produce more meat and milk.

Disadvantages of zero grazing

- Constructing the structure is costly.
- Feeds have to be grown or bought.
- Cleaning the built structure daily is tiresome.
- Spread of diseases is easy in case of out break.

CATTLE DISEASES AND PARASITES

Cattle diseases are classified according to their causative agents (germ) and method of spread. There are three main causative agents (germs) namely;

- Bacteria
- Viruses
- Protozoa

Signs of sickness in animals (cattle)

- The animal is dull and has rough hair on the body.
- The animal coughs and sneezes
- There is diarrhoea.
- The animal has difficulty in passing out urine and dung (faeces)
- There is rise in body temperature and pulse rate.
- The animal loses appetite for food (pasture)

Causes of sickness of diseases in animals

- Diseases in animals can be caused by lack of some nutrients in the animal's diet.
- Dirty environment and dirty food.
- Physical injuries like cuts and wounds
- Infectious by germs.

Signs of goods health in animals (cattle)

- The animal feeds well i.e. have good appetite.
- The eyes are clean and bright.
- The animal walks steadily
- The nose is cold and wet.
- The hair is smooth and shining
- The animal's ears are warm and alert.
- Urine and dung (feaces) is passed out without difficulty.

Ways routes of disease infection in animals

- Direct contact with sick animals
- Direct contact through food and water.

Types of cattle diseases
- Bacterial diseases
- Theses are diseases caused by bacteria

ANTHRAX
- This is caused by bacillus anthracis bacterium.
- It is an acute infectious disease which attacks cattle, sheep, goats, pigs and humans.

Signs and symptoms
- Oozing out of dark blood from natural opening
- Death within 24 hours
- Blown up stomach when animal dies

Prevention and control
- Treat early cases with antibiotics
- Carcass of the animal should be completely burnt or buried.
- Do not open the carcass of animals that are suspected to have died of anthrax.
- Never eat meat of animals suspected to have died of anthrax.
- Vaccinate animals every year.
- Report suspected cases of anthrax.

MASTITIS
It is an infectious bacterial disease that affects the mammary glands (teats and udder) of cattle, sheep, goats, bitches and humans.

Signs and symptoms
- Milk turns watery or thick clots with blood and pus in it.
- The udder and teats swell.
- The cow rejects milking and sucking by the calf.
- The affected udder gets dead and gives no milk.
- Death of the animal may result.

Prevention and control
- Treat early cases with antibiotics
- Milk out teats and massage with warm water.
- Ensure good hygiene when milking
- Use disinfectants when milking
- Use the right milking techniques

Calf scour
It is an infectious disease caused by bacteria.
Attacks piglets, calves, kids, and humans.

Signs and symptoms
- Profuse sharp smelling diarrhoea
- Dullness and loss of appetite.
- Slight rise in temperature
- Sudden death in calves and piglets with blown up and hard stomachs

Prevention and control
- Strict cleanliness must be observed in calf pens, kraals, pig stys etc.
- Avoid damp wet conditions
- Treat infected cases with antibodies.

Black quarter
It is an acute infectious disease caused by bacteria.
It attacks ruminants such as cattle, goats, and sheep.

Signs and symptoms
- High fever
- Shivering
- Loss of appetite
- Lameness
- Muscles are swollen and painful

Prevention and control
- Vaccinate animals early
- Never open carcass of animal that shows signs of black quarter
- Burn or bury dead animals

PNEUMONIA
It is an infectious disease of the lungs
It is caused by various types of bacteria and viruses.

Signs and symptoms
- Difficult breathing and coughing due to congestion of bronchioles
- Nasal discharge
- Loss of body weight
- The animal is reluctant to move dull and sleepy.
- Loss of appetite
- The animal's temperature may be high or low.

Prevention and control
- Treat early cases of pneumonia with antibiotics
- Keep building well ventilated, warm, and clean
- Provide soft feeds and water.

Foot rot

- It is caused by bacteria of fusiformis group.
- It attacks hooves of all hoofed animals. This disease is usually common during wet weather.

Signs and symptoms

Hooves of animals swell making them lame.
Parts of hooves may contain pus and smell.

Prevention and control

- Treat early cases of foot rot with antibiotics.
- Trim affected hooves properly and isolate the animal
- Provide animals with foot bath every week.
- Routine trimming and examination of the feet.

BRUCELLOSIS

- It is an infectious disease caused by brucella abortus bacteria. It affects cattle, goats, sheep, and man.
- It is spread through food contaminated with discharge from infected animals.

Signs and symptoms

Abortion in animals followed by brownish discharge from the vagina
The testicles swell
There is still births in cows
The placenta remains in the uterus (womb)

Prevention and control

- Cull and slaughter the infected animal.
- Vaccinate all young females especially cattle.
- Don't touch aborted foetus with bare hands.
- Milk from infected animals should be boiled first.

Contagious bovine pleuro-pneumonia

It is caused by bacteria discharge from the noses of infected animals

Prevention and control

Cull and slaughter all infected animals
Impose quarantine in case of an out break.
Early vaccination of the herd.
The disease has no treatment yet.

TUBERCULOSIS

- It is a chronic infectious disease caused by micro-bacterium Tuberculosis.
- It is spread through inhalation of the bacteria.

Signs and symptoms of tuberculosis

- Loss of appetite at advanced stages
- Coughing and decrease in milk production

Prevention and control

Practicing good hygiene
Cull and slaughter infected animals.

VIRAL DISEASES

These are diseases caused viruses, most viral diseases are;

Rinder pest (Capital letters)

- It is a highly infectious disease caused by virus.
- It attacks the membranes of the alimentary canal.
- It can kill large number of animals.

Signs and symptoms

- High fever
- Severe dullness and loss of appetite
- Serious diarrhea with blood stained cow dung.
- The muzzles, nose and muscle become hot with fast breathing.
- Rapid dehydration resulting in emaciation with sunken eyes.

FOOT AND MOUTH DISEASE

This is an acute contagious disease of ruminants such as cattle, sheep, goats etc. it attacks the membranes of mouth and coronet.

Signs and symptoms

- Fever, dullness and loss of appetite for pasture.
- Serious salivation in the mouth
- Lameness due to wounds on the cornet.
- Painful blisters around the mouth, udder and between the hooves.
- Emaciation
- Reduced milk yield.

Prevention and control

- Vaccinate animals
- Affected animals should be slaughtered
- Application of quarantine.

Nairobi sheep disease

This is an active viral disease of sheep and goats.

It is transmitted by the brown ear and bont ticks.

Signs and symptoms
- High temperature.
- Diarrhea
- Nasal discharge
- Rapid breathing
- Abortion in ewes.

Prevention and control
- No treatment
- Control ticks to prevent the disease.

PROTOZOAN DISEASES
These are diseases which are mostly associated with blood sucking insects and ticks examples; Nagana (trypanosomiasis), East coast fever, Red water, Heart water.

RED WATER
It is caused by a protozoa transmitted by brown ear tick. It attacks cattle, goats and sheep.

Prevention and control
- Isolate sick animals
- cull and slaughter the sick animals
- Add coccidiostat in feeds and water.

Signs and symptoms
- High temperature
- Constipation and dullness
- Animal becomes anaemic
- Animal licks soil
- Presence of red blood pigments in the urine.
- Swollen lymph nodes.

Prevention and control
- Tick control by spraying and dipping
- Inject animals with ant-babesia drugs.
- Some respond with tetracycline antibiotics.

EAST COAST FEVER
It is a serious protozoan disease spread by both the red-legged and brown ear ticks. It attacks cattle only especially the calves are vulnerable.

Signs and symptoms
- There is rapid rise in temperature

- Swollen lymph nodes especially along the delap.
- There is general body weakness.
- Difficulty in breathing.

Prevention and control
- Burning areas affected with ticks.
- Fencing farms to prevent stray animals.
- Spraying and dipping animals regularly.
- Controlled grazing
- Smearing animals with a carcides
- Deticking by hands
- Antibiotics and sulphur drugs are used to control secondary infections.

ANAPLASMOSIS (GALL SICKNESS)
- It is caused by a protozoan
- It is transmitted by the blue ticks.

Signs and symptoms
- The animal gets constipation.
- Blood in urine and dung (feaces)
- The animal becomes anaemic
- The temperature may fall.

NAGANA (TRYPANOSOMIASIS)
- It is an infectious protozoan disease of animals such as cattle, goats, dogs and horses.
- In man, the disease is called sleeping sickness. It is transmitted by a tsetsefly and caused by a germ called Trypanosoma (e.g. t. Virax, t.congolese, t. bruscei)

Signs and symptoms
- Fever, dullness and loss of appetite
- Anaemia and emaciation
- Licking of soil by Animals
- Swollen lymph nodes
- Running eyes which leads to blindness.
- Death may occur after several weeks.

Prevention and control
- Clear bushes to control tsetse flies
- Spray with insecticides to kill tsetse flies
- Using tsetse fly traps to kill adult tsetse flies
- Treat using drugs such as ethidium.

NB; Tsetse flies breed in swampy and frosted areas. They do not lay eggs but hatch the young ones in the body and deposit them.

HEART WATER
It is a protozoan disease spread by ticks (it is a tick borne disease) it attacks cattle, sheep and goats.

Signs and symptoms
- High fever and loss of appetite
- Animal moves in circles
- Animals become restless and places the head against hard objects.
- When it falls, the legs keep peddling in the air.

RED WATER

Cattle parasites
- A parasite is a living organism that lives on another living organism and obtains its food from it. Or
- A parasite is a living organism that depends on another living organism for food.
- The organism on which a parasite depends for food is called a host.
- A parasite eats food made for the growth and development of the host.

Types of parasites
Parasites are grouped into two namely;
i) External Parasites/Ecto parasites
ii) Internal Parasites/Endo parasites

External Parasites
External parasites are parasites that live outside body of the host. Examples are; ticks, tsetse flies, mites, lice, jiggers etc.

Internal Parasites
Internal parasites are parasites that live inside the body of the host. They live in muscles, intestines, liver etc examples of internal parasites are; tape worms, round worms and liver flukes.

Effects of parasites of cattle
- Pests like ticks, tsetse flies, mites and fleas suck blood from the host leading to emaciation.
- Some pests spread diseases to animals e.g. Nagana, East coast fever, red water. Etc.
- Some pests cause damage to the skin of the host making it of low quality.
- Some pests cause discomfort and irritation to the host
- Some parasites suck food and blood from host making it malnourished and unhealthy.

Prevention and control of cattle parasites.
- Some of them can be controlled by dipping and spraying cattle with acqricides
- Clear bushes and use tsetse fly traps to control tsetse flies.
- Drain grazing areas to control liver flukes.
- De-worm animals with de-worming drugs.

- Keep animals away from pastures which are frequently covered by floods.
- Use double fencing of grazing areas and kraals to control ticks.
- Burn all the old pasture.
- Practice rotational grazing

Requirements for starting a livestock farm
To start a farm, a farmer requires the following;

a) Land

This is the place where the farm is located. it is used for growing pasture, building houses etc, the land may be bought, inherited from parents, rented or hired.

b) Capital

This refers to the money and all the buildings equipments and materials and to start a farm. Capital may be a donation, borrowed from a bank inherited from sales of property or monthly earnings.

c) Labour

Refers to all the people who perform the different tasks on the a farm. The farmer does not have all the skills and time for everything on the farm. He may employ workers, hire labourers, or use family members.

d) Management

This refers to organizing, planning and guiding the rest of the workers to carry out their duties in a more organizing way and make the farm profitable. The farmer may manage him/herself or employ others.

e) Market

Before starting a farm, one should ensure that there is market for the farm products such as meat, milk, eggs, hides etc.

f) Farm

These are written account/documents of the activities of the farm.

IMPORTANCE OF KEEPING FARM RECORDS

- To help the farmer know whether he is making profits or losses.
- For fair assessment of taxes
- To enable the farmer to make decisions
- In case a farmer dies with out writing will, it helps the family members to share property equally.
- To enable the farmer know the history of the farmer.
- Helps the farmer to plan and budget for the farm.

TYPES OF FARM RECORDS

- **Breeding records**: These include reproduction, birth or death rates.
- **Production records:** These show yields of various farm produce e.g. eggs, milk, meat etc.

Health records: These include when and which animals were sick, what treatment they got or which ones to cull.

- **Labour records:** These include the number of farm labourers, type of work they do and their wages.
- **Field operations records:** These are records of all different activities carried out on the farm ploughing, harrowing, planting etc.
- **Marketing records:** These include where, when and what prices various products were sold.

- **Inventory records:** This is a record of all the things a farmer owns and the cash values of each item.
- **Income and expenditures**: These are records of all the sales and purchases of the farm business.
- **Feeding records:** These show the amount of feeds bought, consumed and methods of feeding.

PRACTICES WHICH HARM CATTLE AND OTHER DOMESTIC ANIMALS AT HOME

- Beating animals
- Over working animals
- Not treating sick animals
- Dehorning
- Castration
- Branding

IN THE FIELD

- Over beating animals
- Overworking animals
- Not giving animals adequate feeds
- Improper disposal of polythene bags

IN TRANSIT

- Over loading animals
- Transporting animals when some legs are hanging out of vehicles
- Over tying animals during transportation.

IN THE ABATTOIR

- Slaughter animals brutally
- Killing animals by banging their heads with hammer, axe or iron bars
- Handling animals rudely when going to slaughter

RESOURCES IN THE ENVIRONMENT

A resource is something or object which is used for certain purpose.
Some resources are got from non-living things while others are got from living things.

Types of resources

1. Non renewable resources
   These are resources which can't be replaced naturally once they are used up.

Examples are:

i) Minerals ores
ii) Crude oil (petroleum)
iii) Coal

2. Renewable resources
   These are resources which can be replaced naturally before they get exhausted (used up)

Examples are:
   i) Soil
   ii) Water
   iii) The sun
   iv) Air (wind)
   v) Plants
   vi) Animals

Resources from non living things
A non living thing is one without life.

Example
- Soil
- Water
- Air and wind
- Rocks and minerals

a) Soil
Soil is a natural layer which covers the earth's surface.
Soil is a renewable resource.

How is soil used as a resource?
It is used for growing crops
Soil is used for building houses in our societies

b) Water
Water is a renewable resource when used carefully.

How water is used as a resource?
- Water helps plants to grow
- Water is used to turn turbines for hydro-electric power generation.
- Water helps to dissolve food for easy absorption in the body of animals.

c) Air and Wind
Both are renewable resources
Air is a mixture of gases
Wind is moving air.

How wind is useful
- Wind turns wind mills to produce electricity
- Wind drives wind mills to draw water from the underground

- Wind helps in winnowing of harvested crops.

d) Sun

It is a renewable resource

How the sun is used as a resource

- The sun provides sunlight energy to green plants to make starch.
- The sun provides solar energy that gives out heat and light energy to man.
- The sun helps our bodies to make vitamin D
- The sun helps in generation of solar electricity.

Rocks and minerals

A mineral is any thing that occurs naturally like a rock in the earth.
They are non-renewable resources.

Examples of minerals

- Crude oil (petroleum)
- Chalk
- Clay
- Copper
- Gold
- Tin etc

Minerals are non-renewable resources.

N.B: Minerals from which metals are got are called ores.
Rocks
A rock is a substance made up of minerals tightly packed together to form a solid.

Types of rocks

i) Igneous rocks
ii) Metamorphic rocks
iii) Sedimentary rocks

Igneous Rocks

These are rocks formed when magma pours outside the earth as lava and solidifies
They are generally hard and impervious.
Examples

- Basalt
- Granite
- Quartz

Sedimentary Rocks

These are rocks formed from broken particles of sand clay and mud setting in different layers. (strata) at the beds of water bodies like seas, lakes, rivers etc.
Sedimentary rocks are soft and porous.

Examples
- Sandy rocks
- Limestone etc

FOSSILS
- Fossils are remains of plants and animals buried underground many thousands of years ago.
- They are found deep inside the earth in sedimentary rocks.
- These remains are usually of bones or teeth of animals and roots, leaves or stems of plants.
- Some times the remains are of mould of a whole body e.g. of a fish.

Uses of fossils
- Fossils help geologists to determine the age of a place or rock.
- Fossils help geologists to know how different plants and animals have existed and changed.
- Fossils help to tell how land looked before.
- Fossils show us how and where the different sedimentary rocks were formed.
- Fossils help to tell what the animal or plant looked like, what it ate, where it lived etc.

Importance of rocks
- Rocks form soil, which is important to our survival
- Rocks make good materials for building and roads.
- They tell us about the earth's history.
- They contain many valuable minerals

ALLOYS
An alloy is a mixture of two or more metals

Alloy	Combination	Uses
Brass	Copper and Zinc	- Decorating ornaments - Making wires, tubing cases for bullets.
Dentist Amalgam	Gold and Copper, gold, copper and mercury	- Making coins.
Solder	Lead and Tin	- Joining metals
Bronze	Copper and Tin	- Used for ornaments , bells , statues

STEEL
Steel consists of Carbon dissolved in iron.
Different alloys are made from steel

Examples of alloys made from steel
i) Manganese steel

It is a mixture of steel and manganese
This is a very tough alloy.

It is used where friction may cause wear e.g. in railway points.

ii) Nickel steel

It is a mixture of nickel and steel

This alloy does not rust. It is used for making cooking and kitchen utensils and cutlery.

iii) Stainless steel

It is a mixture of cobalt and steel

This alloy is used to make permanent magnets because they retain their magnetism over a long period.

Why are alloys made?

- To make the metal harder
- To lower the melting point of the metal.
- To make the metal more resistant to corrosion i.e. wear and tear
- To increase the electrical resistivity of metals.

FUELS

A fuel is anything that burns to produce heat and light energy.

Examples of fuels

- Fire wood
- Charcoal
- Crude Oil (Petroleum)
- Coal

- Fire wood and charcoal are renewable resources while crude oil and coal are non-renewable resources.
- Coal was formed from marshy vegetables and plants which lived long ago and were buried under ground but due to heat and pressure they changed to coal.
- Coal is burnt to get thermal electricity.
- Crude Oil (petroleum) is refined through the process of fractional distillation.
- The products after refining crude oil (petroleum) are; Petrol, diesel and kerosene.
- These products are burnt to produce heat and light.
- Petrol and diesel are used to run engines.
- Oil was formed from animals remains which buried underground long ago and were changed to crude oil due to heat and pressure

<u>Resources from living things.</u>

- A living thing is one which has life.
- Living things include plants and animals.
- Most of the resources from living things are renewable resources once they are looked after properly.

How are plants used as resources?

- Some plants give us natural plant fibres like cotton, sisal, jute and linen.
- Cotton and linen are used to make clothes while sisal and jute are used to make ropes.

- Some plants are used as herbal medicine to cure certain diseases.
- Some plants are eaten as food by man and other animals.

How are animals used as resources?

- Some animals like merino sheep provide wool, used to make clothes, suits, blankets, carpets, curtains, bed sheets etc.
- Silk worms provide silk used to make different types of cloths.
- Some domestic animals provide skins and hides used to make bags, shoes, belts, etc
- Cattle provide horns and hooves used to make glue.
- Bees help to pollinate farmers' crops, provide honey and bee wax.
- Some animals like oxen and donkeys provide labour.

<u>Conservation of resources</u>

- Conservation is the protection and proper management of resources in our environment.
- Both renewable and non-renewable resources need to be conserved.
- Resources like forests, wild life, water, soil, rocks, minerals need to be conserved.
- Conservation of resources is done to keep them doer future use.

Conserving renewable resources

i) Conserving renewable resources

- Wild life refers to animals and plants in our environment.
- Many kinds of animals have disappeared from earth and they are extinct.
- Other animals are about to disappear and we say they are endangered.
- Animals may become endangered or extinct because they are killed for their skins, horns, tusks.
- Some plants have also become endangered or extinct due to the increasing demand for wood and local medicine.

Advantages (importance) of conserving wildlife

- Some mammals, plants and birds are a source of food for man.
- Some animals and birds are valued as cultural heritage by some countries and clans.
- Plants are homes of many animals, birds and insects.
- Trees or forests help in the formation of rainfall.
- Mammals, birds and trees species earn foreign exchange for the government through tourists.
- Plants improve the atmosphere by balancing the amount of carbon dioxide and nitrogen.
- Plants provide shade to man and other animals.

How to conserve and protect wild life.

- Animals are protected by law in their habitat through the Uganda Wildlife Authority (UWA).
- A habitat is a natural environment or home of a plant or animal.
- Uganda wildlife Authority is a department which is responsible for wildlife in Uganda.
- The animals are being taken care of in national game parks and game reserves.
- Banning the selling and buying of wildlife trophies helps to reduce their being killed.
- Fishes can be conserved by controlled fishing.

- Some rare animals should be caught and let to breed in wildlife educational centre.

Conserving non renewable resources
- Soil erosion should be controlled.
- Soil should be kept fertile by using manure and fertilizers.
- Plastic wastes like broken Jerrycans, polythene papers should be recycled.
- Vehicles in dangerous mechanical conditions should be repaired to conserve fuel.
- Petroleum products should be used wisely to prevent further exploitation of oil.

Conserving the natural vegetation
- Over grazing should be discouraged because it causes soil erosion.
- Bush burning should be restricted to certain areas.
- Over stocking is dangerous because it leads to over grazing.
- The government should limit population growth because more people means more land to be destroyed for housing and agriculture.
- Cattle farmers should practice rotational grazing which later causes soil erosion.
- Afforestation should be practiced.
- Swamps and wetlands should be declared restricted areas.

HARVESTING RESOURCES
This is the collection of materials from the environment for the purpose of using them

a) Harvesting non – living resources
- Obtaining sand from dry river beds: scooping it with spades and machinery
- Mining sand from the ground

Harvesting minerals
- By mining
- Fossil fueling like oil
- By drilling

Harvesting energy from the sun
Energy from the sun is known as solar energy
- It can be harvested in the following ways
- Uses of solar panels
- Use of solar cookers
- Use of solar driers
- Use of solar heaters

NB : Solar panels trap sunlight and convert it into solar electricity

Solar heaters + cookers trap rays from the sun and changes into heat energy

Harvesting water
Ways of harvesting water
- It can be collected from roofs using tanks and big drums
- Rain water flowing on the ground is directed into dams .
- Water can be drawn from wells and brought to the surface using wind loss and electric pumps.

Harvesting energy from air

- Wind can be trapped and used to drive wind mills
- It can be tapped using sail to drive sail boat + dhows

Harvesting living resources

Plants resource

- Hand picking ripe coffee berries , cotton balls
- Plucking tea leaves from tea plants
- Ready maize cobs are harvested by hands
- By cutting sisal leaves

Harvesting wood

- By pollarding
- By coppicing
- By lopping
- By selective felling

Pollarding

It is the cutting off of the top part of a tree for use.

Diagram

Coppicing

It is the cutting off of the main part of the main part of the tree stem leaving the stump to give rise to new shoot.

Diagram

Lopping

This is the cutting of the side branch for use

Diagram

Harvesting animal resources

a) Meat

Animals are slaughtered , skinned and meat cut off from the carcass.

b) Skins and hides

Animals are slaughtered and skins carefully removed from the carcass.

c) Horns

The horns are cut or sawn off with the saw from the head of the slaughtered animals

d) Milk
it is obtained by milking using either hands or machines
d) Honey :
it is extracted from honey combs.

THE ENVIRONMENT
What is environment?
Environment refers to all things that surround man. These things can be air water , plants temperature , fuel , people building etc.
COMPONENTS OF ENVIRONMENT
The environment is composed of the following

- Water
- Land (soil)
- Air (wind)
- Plants
- Animals
- Temperature
- Mountains (hills)
- Minerals
- Sun

TYPES OF ENVIRONMENT
Environment is divided into two types:-

Biological environment (Abiotic / non physical environment)
This is the type of environment which consists if living things eg plants and animals

Physical environment (a biotic environment)
This is the type of environment which consists of non – living things eg mountains , lakes , rivers , temperature , wind (air) vapour.

FOOD CHAIN
A food chain is the way how organisms in an environment get their food. In the environment , plants make their own food and are called producers .
The organisms which depend on food made by plants (producers) are called consumers are consumers
Consumers are divided into the following groups

Primary consumers
These are organisms which feed directly on producers eg goats , cattle , rabbits, sheep etc

Secondary consumers
These are organism which feed on primary consumers eg foxes , dogs , lions

Tertiary consumers
Tertiary consumers which feed on secondary consumers eg. leopards , man birds of prey etc.
NB: In a food chain , organism like fungi and bacteria help in reducing food to its component parts (decay / rot) are called decomposers
The sun is the main source of sunlight energy in a food chain from which energy flows to other organism in the environment

Illustration of a food chain
Producer – primary consumer – secondary consumers – Tertiary consumers – plants grasshoopers – lizard – Hawks

A FOOD WEB
A food web is a more complicated interrelationship of how organism in an environment obtain their food.
A food web involves many organism in an ecosystem how they get food from many other living things
Illustration of a food web

Ecosystem
An ecosystem is the community of livingthings (organisms) in a habitat plus the non living part in the environment .

A habitat
A habitat is a home of a living organism in the environment

DEGRADATION
Degradation is the way of lowering (spoiling) the quality , stability and usefulness of a resource.

Environment degradation
Is the lowering the quality , stability and usefulness of resources in the environment

Types of environment degradation
- Soil / land degradation
- Degradation / deforestation
- Wetland drainage
- Air / atmospheric pollution
- Water pollution
- Wild life destruction (degradation)

Causes of environmental degradation
There are two main causes of environmental degradation
a) Human activities
b) Natural causes

HUMAN ACTIVITIES THAT CAUSES ENVIRONMENTAL DEGRADATION
a) Mining / quarrying

b) Construction and road work
c) Poor waste disposal
d) Bad agricultural practices eg bush burning , over grazing etc

NATURAL CAUSES ENVIRONMENTAL DEGRADATION

- Soil erosion / leaching
- Silting
- Hurricanes
- Tornados
- Whirl wind / whil pools
- Earth quakes
- Hailstones
- Land slides
- Floods
- Tsunamis
- Volcanic eruptions
- Global warning

a) Soil / land degradation
This is the destruction / lowering the quality or usefulness of land by human activities or natural causes.

Leaching
Is a process through which mineral salts or nutrients sink deeper into the soil layers where they can not be reached by plants
It is caused by too much rain.

Soil erosion : Is the washing / blowing away of top soil by agents of erosion.

Silting
Is the process by which fine sand , mud or other things are carried into the water body.

Causes of silting

- Soil erosion
- Cultivation near water sources
- Allowing animals to drink from water bodies
- Swamp drainage
- Burning / destroying vegetation in the swamp

Effect of silting

- It destroys habitat for animals that live live in water
- Lower water level and so dries out water bodies
- Destroys source of food for fish and other aquatic animals
- Kills fish of other animals and plants in water
- Destroys eggs of fish and other aquatic animals.

Deforestation
Deforestation is also called devegetaion ie cutting down large number of trees / plant with out replacing them.

Causes of deforestation
- Population growth leading to need for land for settlement , farming and recreation
- Industrialization (development of industries in an area)
- Wild fires / bush burning
- Clearing forests for fire wood , charcoal , building poles timber etc

Effects of deforestation
- It leads to reduction of rain fall causing drought / desertification
- Loss of habitat for different plants and animal species
- Soil erosion leaving infertile soils
- Silting of water bodies.

Wet land
A wet land is any area which has water and growing vegetation through out the year

Examples of wet lands
- Swamps
- Marshes
- Bogs
- Lakes and rivers

Importance of wet lands
- They are habitats to many plant and animals speces
- They control floods by sucking the water
- They filter muddy water by trapping the impurities
- They regulate the climate by influencing the temperature and humidity
- They provide water
- They provide water for domestic and industrial use.
- They are sources of food e.g. fish
- They provide raw materials for arland crafts e.g. clay, papyrus etc
- They are sources of building materials

POLLUTION
Pollution is the addition of harmful (dangerous) chemicals into the environment
Pollution takes place naturally or through human activities.

CAUSES OF POLLUTION
- Waste gases from industries

- Industrial waste / chemical
- Exhaust fumes from vehicles
- Oil spills from ships in the ocean
- Chemical sprays
- Non bio-degradable wastes eg polythene , glass plastics etc
- Smoke from burning tyres , oil or bushes
- Dust

TYPES OF POLLUTION

a) Air pollution - caused by smoke and fumes / poisonous gases.
b) Soil pollution – caused by agricultural sprays, industrial waste , refuse etc
c) Water pollution - By silt , oil spills , refuse , human waste and industrial waste washed into it.
d) Noise pollution – Due to too many vehicles or industries in the environment loud music etc

EFFECTS POLLUTION

- Poisoning of soil and water by chemical wastes dumped on them.
- Death and disappearance of biodiversity (variety of plants and animals living things)
- Out break of disease in the environment
- Loss of soil fertility leading to poor yields
- Formation of acidrains due to gases from industries and vehicles as they dissolve in rain.
- Destruction of habitats for many plants and animals
- Less production of plants such as fibers , timbers fruits and other construction materials

CONTROL AND PREVENTION OF POLLUTION IN THE ENVIRONMENT

- Uses of alternative energy source eg. bio gas , natural gas , solar energy , wind power , hydro electricity
- Ensure proper disposal of domestics and industrial wastes
- Educating people about the dangers of pollution
- Using good method of farming

RESPIRATORY SYSTEM

What is respiration?

Respiration is the process by which the body uses food and oxygen to produce energy, carbon dioxide and water vapour. Respiration takes place in body cells.
The by-products of respiration are;

i) Carbon dioxide
ii) Water vapour

BREATHING

Breathing is the taking in and out of air.
Or it means the constant exchange of gases between an organism and the surroundings. The respiratory organs in man are the lungs.

The respiratory system

- This deals with the use of oxygen in the body.
- Lungs are the respiratory organs situated in either sides of the chest cavity.
- Lungs are covered in a membrane called pleural membrane.
- Fluid that lubricates the lungs and ribs and so reduce friction.
- Lungs are protected by the part of the brain called Rib cage.
- The ribs are held in position by the intercostal muscles.
- In the lower side of the lungs is a diaphragm that separates the chest cavity from the abdomen;

The structure of the lungs, parts and their functions.

Types of breathing

i) Expiration (breathing out) exhalation.
ii) Inspiration (breathing in) inhalation.

Functions of parts of the breathing system

i. The nose

It contains mucus which /that warms and moistens air before reaching the lungs.
It contains hair like structures called Cilia that trap germs and dirt that may enter the nose.

What happens to the air in the nose?

Air is filtered (cleaned) warmed and moistened.

What happens to the air in the mouth?

No mucus to moisten and warm air.
No cilia to filter air by trapping germs and dirt.

ii. The trachea (wind pipe)

It has an epiglottis that protects the opening of the trachea when swallowing food.
Epiglottis prevents choking.
Air enters into lungs which contains the voice box. Inside voice box are vocal cords which help in producing sound.
Trachea contains rings of cartilage that prevents it from closing and prevents suffocation.
The exchange of gases take place in the air sacs.

iii. The air sacs

This is where the exchange of gases takes place by diffusion.

Adaptations of air sacs to their function
They have walls to all diffusion take place.
They are surrounded by a net work of capillaries which bring carbon dioxide and take oxygen.
They are many in number.

The structure of the villus

Composition of air breathed in and out.

Type of air	Inspired air	Expired air
Oxygen (O_2)	21%	16%
Carbon dioxide (CO_2)	0.03%	4%
Nitrogen (N_2)	79%	79%
Water vapour	Less	More

What happens during inspiration (inhalation)

- The volume of the chest and lungs increases.
- Diaphragm and intercostals muscles contracts.
- Ribs move upwards and outwards.
- The lungs increase in volume

What happens during expiration /exhalation?

- The volume of the chest and lungs decreases.
- The diaphragm and intercostals muscles relax.
- Ribs move downwards and inwards.
- The lungs decreases in volume.

Diseases that attack the breathing/respiratory system.

Tuberculosis	Bronchitis
Influenza	Asthma
Diphtheria	Pneumonia
Emphysema	Whooping Cough

Habits that improve the working of the respiratory system

- Avoiding smoking
- Having regular physical exercises.
- Good feeding/nutrition
- Eat food with low and fat
- Keep away from dusty places etc.

<u>Disorders of the respiratory system</u>

Choking
Hiccup

Sneezing etc

RESPIRATION IN RELATION TO FOOD AND OXYGEN

- Respiration is the chemical burning of food in the presence of oxygen in order to release (produce) energy
- Water and carbondioxide are released as by products.
- Respiration takes place in the body cells
- Food + oxygen $\longrightarrow$ carbondioxide + water + energy (ATP) (Starch)

Types of respiration

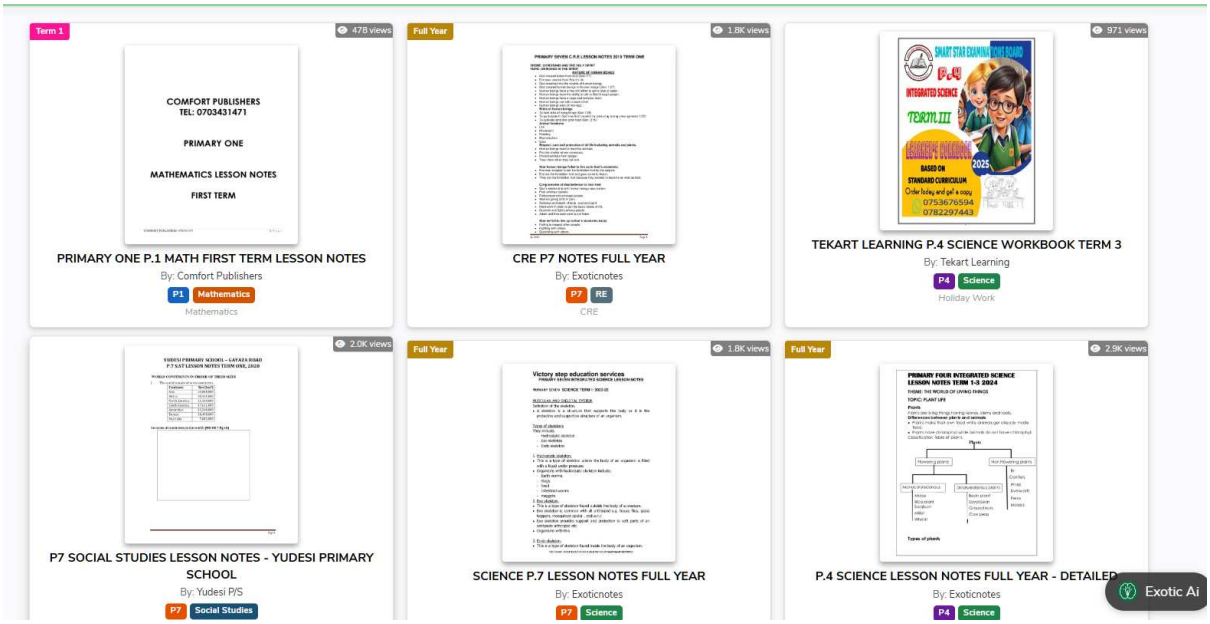
Aerobic respiration

Is respiration which uses oxygen.

Anaerobic respiration

It is a type of respiration which takes place in absence of oxygen and in which food substances are only partly broken down. It produces lactic acid in animals and alcohol in parts. It occurs in muscles during exercise.

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