WAC ACADEMIC CONSULTANCY

PRIMARY SIX SCIENCE LESSON NOTESTERM ONE TO THREE

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P.6 SCIENCE LESSON NOTES TERM ONE TO THREE

THEME: THE WORLD OF LIVING THINGS
TOPIC: CLASSIFICATION OF LIVING THINGS

CONTENT

Characteristics of living things

- They feed
- They grow
- They reproduce
- They respond to stumuli
- They move
- They excrete
- They respire.

Living things are divided into five kingdoms namely;

- Animal Kingdom
- Plant Kingdom
- Prokaryotal (Bacteria Kingdom)
- Protoctista (single celled organisms)
- Fungi Kingdom

Animal Kingdom

Animals are classified into two groups

- Vertebrates
- Invertebrates

Vertebrates

Vertebrates are animals with a back bone /vertebral column (spine)

Groups of vertebrates

Vertebrates are classified into five groups;

- Mammals
- Birds
- Reptiles
- Fish
- Amphibians

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Vertebrates are also grouped into two;

i. Warm blooded (homoeothermic)
ii. Cold blooded (poikilothermic)

Warm blooded

i) Mammals
ii) Birds

Cold blooded

i) Fish
ii) Reptiles
iii) Amphibians

MAMMALS

Mammals are vertebrates which have mammary glands.

Characteristics of mammals

- Mammals are warm blooded
- They have fur on their bodies
- Most of them give birth to living young ones.
- They feed their young ones on breast milk
- They breathe through the lungs.
- Their hearts are divided into four chambers

Groups of mammals

- Primates (most advanced /fingered mammals)
- Ungulates (hoofed mammals)
- Carnivorous mammals(flesh eaters)
- Rodents (gnawing mammals)
- Insectivorous(insect eaters)
- Pouched mammals (marsupials)
- Flying mammals (chiroptera)
- Egg laying mammals (monotremes)
- Sea mammals (cetaceans)

Primates (fingered mammals)

These are the most advanced group of mammals.

Characteristics

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- They have well developed brain
- They use front limbs for holding and hind limbs for walking.
- They have five fingers on each hand and five toes on each foot.
- They are omnivorous i.e. they feed on both flesh and vegetables.
- They have well developed set of all the four types of teeth i.e. incisors, canines, premolars and molars (32 teeth)

Examples of primates
Man, monkeys, apes, gorillas, baboon, bush baby, chimpanzee, orangutan.

Ungulates (hoofed mammals)
All mammals in this group are herbivorous i.e. they feed on vegetation.
Ungulates are divided into two sub-groups

i) Even toed ungulates
ii) Odd toed ungulates

Even toed ungulates
They include; Okapi, deer, pigs, cattle, giraffe, sheep, antelopes, hippopotamus
Even toed ungulates are subdivided into two;

i) Ruminants
ii) Non ruminants

Ruminants
These are ungulates with four stomachs and chew cuds. Most of them have horns which they use for protection.
Examples

- Cattle
- Goats
- Sheep
- Camel

Antelope etc

Non ruminants

- These are ungulates which do not chew cud but have a complete dentition.
- They have well developed canines which they use for protection

Examples include;
Pigs, hippopotamus, warthog.

Odd toed ungulates
The number of toes is always off e.g. one in horse, donkey, Zebra and three in elephant and Rhino.

Carnivorous mammals

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Characteristics of carnivorous animals

- They are strong mammals
- They have well developed canine teeth for tearing flesh of their prey.
- They have sharp claws for holding, killing and tearing their prey.
- They have a very good speed, good sense of smell, keen eye sight and good hearing.
- This is why they even hunt at night.
- Their feet have soft pads therefore thus can ran after their prey without making noise.

Carnivorous mammals are divided into two families;

a) Dog family – Face resembles that of a dog
b) Cat family – face resembles that of a cat.

Examples of the dog family include; Domestic dog, hyena, jackal, fox etc
Examples of the cat family include; lion, leopard, tiger, cheetah, man goose, domestic cat.
Some carnivorous are scavengers e.g. hyena, jackal.

Gnauling mammals (Rodents)

- These are mammals which have well developed incisors used for bitting and chewing powerful and rapidly.
- They don't have canines.
- Most rodents are herbivores (vegetarians)

Examples include; Rats, squirrels, mice, rabbits, hares, porcupines, guinea, pigs and moles.

Insect eating mammals (insectivores)

- These are mammals which feed on insects.
- They have a sensitive snout and strong claws for digging.
- They are nocturnal i.e. they hunt at night and sleep during day.
- Examples include; Hedgehog, elephant shrew, Aardvark.
- A hedgehog is an animal with spines on its body. When threatened, it rolls itself up into a ball.

Flying mammals (chiroptera)

Bats are the only true flying mammals.
They have a fold skin attached to the fore limb which act as wings.
There are three main types of bats;

a) Insect eating bats: These are helpful to man because they eat many harmful insects like mosquitoes.
b) Fruit eating bats:
c) Blood sucking bats (vampires) they suck blood from large animals like horses,

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cows, buffaloes etc. bats are nocturnal i.e. they hunt and sleep during day. They can find their food at night in complete darkness by using echoes from the sound they produce.

Pouched mammals (marsupials)
Examples of these include; Kangaroo, Koala bear and Wallabies
Marsupials are found in Australia and south America.

Egg laying mammals (monotremes)
- These are the most primitive in the class of mammals because;
- They resemble birds and reptiles in that they lay eggs and also have beaks similar to those of birds.
- They have characteristics of birds, mammals and reptiles.
- Monotremes are regarded as mammals because they feed their young ones on milk from the mammary glands and for the care they give to their young ones after hatching.
- Examples include; the duck billed platypus and the spiny ant eater (echina) of Australia

Sea mammals (cetaceans)
- These are mammals which live in the sea.
- They don't have gills but they breathe by means of lungs
- They have a layer of fats under the skin called blubber to keep them warm.
- They have a high level of intelligence next to primates
- They have mammary glands
- They give birth to living young ones and suckle them on milk from the mammary glands.
- Most sea mammals have fur.

Examples include; Blue whale, Sperm whale, porpoises and seals

BIRDS
Characteristics of birds
- Their body is streamlined i.e. pointed at the front and back.
- Their bodies are covered with feathers which they molt every year.
- Their bones are hallow i.e. do not have bone marrow.
- They have scales on their legs
- They are warm blooded
- They breathe by means of lungs
- Their front limbs are modified as wings
- They have no teeth but have horny beaks.
- Their eyes have three lids the lower, upper and nictating membrane.
- They lay shelled eggs which are fertilized internally
- They care for their young ones.
- Many of them can fly.

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External features of a bird
Features, alimentary canal of a bird, reproduction in bird
Refers to P.5 (term work)

- Feeding habitants in birds
- Birds have no teeth
- They have a horny beak
- The shape of the beak varies with the type of the food eaten.

Classification of birds

- Birds have a number of special adaptation feathers.
- They are grouped avoiding to the type a beak and feet (claws) they have.
- Some birds are grouped according to the type of food they eat.

Some of the groups are;

- Birds of play
- Perching birds
- Scratching birds
- Swimming birds
- Waching birds
- Fightless (walking) birds
- Climbing birds
- Scavenger birds

1. Birds of prey

- They are carnivorous birds.
- They eat rats, fish, mice, lizard, chicken etc
- They have strong eye sight to spot their even when they are flying
- They have strong sharp, hooked beaks for tearing the prey.
- They have strong sharp curved talons (claws) for gripping and killing the prey.

Examples include; Hawks, eagles, vultures, secretary birds, owls, kites,etc

Structure of the beak and claws

Perching birds

- Birds in his group have;
- Split feet and walking legs.
- Back wardly pointing toe suitable for holding a perch.
- They have one toe pointing backward and three toes pointing forward.

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Types of perching birds

i) Seed eaters

These have short strong conical beaks suitable for breaking up seeds e.g. pigeon, doves, weaver birds finches etc

Structure of the beak and foot

ii) Insect eaters

They have stoat narrow beaks for picking up the insect from the back of trees.
Examples include; Sparrows, robbins, swallows, and swift, bee eaters etc.
Swallows and swifts have short and wide open beaks which help them to catch insects even when flying.

iii) Honey sucker/nector eater

Those have thin long beaks which are slightly curved.
Example, The sun bird.

Structure of the beak

Fruit eater

Those have a long stoat beak for collecting fruits
Example, Horn bill
Structure of the beak

Scratching birds

- These birds feed on seeds and insects which they find by scratching the earth.
- They have short, strong, firm pointed beaks for picking up things from the ground.
- They have strong feet with thick toes and blunt nails.
- They can walk easily
- Their body is heavy and wings are weak.

Examples include; domestic fowls i.e. chicken, turkey, guinea fowl.

Structure of the beak and foot

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Swimming birds

- They have webbed feed whick act like paddles
- They have broad breast bone.
- Their skin has many oil glands which produce oil to protect their body against water.
- They have beaks with small cross plates on the margins which help them to sieve food from the mud.
- Examples include; Ducks, swans, geese, penguins, seagulls, pelicans

Structure of the food and beak

Flightless birds

- These are birds which are unable to fly but can run very fast.
- They have weak and small wings compared to the body size.
- An ostrich is the largest and fastest flightless bird. It runs faster than a hone.

Examples include; Kiwi, penguins, ostriches, emu, rhea, and cross away.

Climbing birds

- They have two toes pointed forward and other two backwards.
- This arrangement helps them in climbing to look for seeds and insects.
- They live in trees and run about on branches of trees.
- Examples include; A parrot, a wood pecker.

The structure of the beak and foot

Scavenger birds

- These birds feed on flesh killed by other animals, rotten meat and fish.
- They usually have beaks similar to those of birds prey.
- They are useful because they clear most of the dead decaying matter which may other wise be a source of many diseases.

Examples include; vulture crows, and marabos storks

The ways in which birds are adapted for flying

- They are streamlined to reduce friction so that they can move through air easily.
- They have hallow bones which reduce weight and their back bones are fused (joined) to give them rigidity.
- They have strong attachment of their powerful and strong front muscles which are used for moving wings
- Their fore limbs are modified into wings
- They have no pinna to abstract the flow of air.
- They have good eye sight to see well from long distances and judge the distance accurately
- They have a nictitating membrane which cover the eye and protect them against moving air during flight.
- Their bodies are covered with flight feathers.

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NB: some domestic fowls are unable to fly high because they have bone marrow which make them heavy.

Advantages of birds

- They are source of food
- The feathers are used for decorations like o hats, suits, hand bags in staffing mattress
- Bones are used for making glue.
- Some birds kept for customary purpose like making sacrifices and paying dowry.
- They are source of income to farmers.
- They attract tourist
- Some birds pollinate flowers like the sunbirds, they pollinate when collecting nector.
- Some help to clean our environment like the vultures, craws and marabour storts.

Disadvantages of birds

- Many birds damage our crops by eating seeds, like millet, rice, maize, sorghum etc many birds are pests
- Some birds cause accident to runaways at the airport.
- They make a lot of noise like the floas and mites

REPTILES

Most reptiles are a viparous animals i.e. they animals which lay eggs viviparous animals are animals which produce living young ones

Characteristics of reptiles

- The cold blooded animals
- They breathe by mean of lungs
- Their waste proof is covered with scales
- Their teeth are similar
- They have a three clambered heart i.e. two a auricles and one ventricle
- With exception of snakes, they have four limbs with claws.
- They have external ears. The tympanic membrane (ear drum) is usually situated below the surface of the body.
- They lay eggs which are fertilized internally. The shells of eggs are either leathery or quite hard made of calcium carbonate.
- They usually don't look after their young ones.

Classification of reptiles

Reptiles are divided into the following groups

i) Snakes
ii) Lizards
iii) Turtles, tortoises, and terrapins

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iv) Crocodiles and Aligators

Snakes

- They have no limbs
- They are carnivorous animals
- Their eyes are without eye lids but each eye is protected by a immovable transparent membrane
- They have a forked tongue which acts as a sense organ for smell and taste.
- They have a large number of ribs and vertebrates.
- They shed (moult) their skin after a certain period.
- Their backward pointed teeth prevent the prey from escaping from the mouth.
- Some snake have poison fangs which have a deep canal through which poison passes.
- The ribs and large scales on the underside of their body also help them to move.
- They hide or move away when disturbed.

Classification of snake

Snakes are grouped into three main groups namely;

- Poisonous snakes
- Constrictors
- Non-poisonous snakes

Poisonous snakes

They have two long teeth called fangs near the front of the mouth to inject venom.
Example of poisonous snakes the Cobra (white bite /spit poison)

- Mamba (black /green)
- Puff udder /night udder
- Viper

Non poisonous snakes

- These do not have fangs and the venom poison.
- They have solid uniform teeth.
- They kill their prey by crashing and suffocating using their strong muscles.
- The lick the prey to make them smooth and slippery and swallow them whole.

Examples of constrictors

- The Python
- Anaconda
- Boa constrictor

First aid for the snake bite

- Apple black stone on the injured part to suck the poison after making cuts
- Stay quiet and rest the bitten part so that the venom does not spread.

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- Tie a bandage /tourniquet above the bite to limit the flow of poisoned blood to the heart.
- Cut between the fang marks and suck out the venom if you do not have wounds in the mouth.
- Take the victim to the nearest health unit to receive anti venom injection.

How to tell that a person has been bitten by poisonous snake.
It leaves two fang marks on the bitten area through which some blood dozes

LIZARDS
They have four limbs and tails which can grow when its cut.
Examples of lizards
- Sinks
- Geckos
- Chameleons
- Agama lizards
- Monitor lizards
- Iguana lizards

Chameleons are slow moving reptiles which protect themselves by changing colour. (camouflaging)
They use their long sticky tongues to capture their prey.
They hatch their eggs inside the body and lay young ones

Tortoises, tortles, terrapins
- These are reptiles that have hard shells on their backs
- Turtles and terrapins have their feet modified into flippers for swimming in water.
- Tortoises move by walking using their strong legs.
- They all lay their eggs in sand on the bank of water.

Diagram showing tortoise and a turtle
NB: tortoise have raised shells while turtles have flat shells,

Crocodiles and alligators
- They are the largest of reptiles
- They live in water and come out to sleep in the sand o the banks.
- They have strong tails for swimming and attacking their enemies /prey
- They have raws of teeth in their long jaws for gripping their prey
- They produce by laying eggs which are buried un sand at the bank of lakes or rivers.

Diagram

Importance of reptiles to man

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- They have good skins which is for making drums, belts, and shoes.
- Their skins can be sold as trophies to get income/money.
- They are sources of food to man.
- Some reptiles like geckos and lizards help to eat disease vectors like mosquitoes in the house.
- They are used for study and research
- Some like crocodiles act as tourist attraction.

Fish belongs to the group of vertebrates called pisces

Characteristics of fish
- They live in water
- They breathe through gills
- They lay eggs which hatch into fires
- Their eggs are fertilized by the male from out side the female's body. In water (external fertilization)
- Most have scales on their body except cattle fish.
- They have fins for swimming and protection
- They are cold blooded vertebrates
- They feed on plants and animals in water.

The structure of the fish

Functions of parts of a fish

Types of fish

There are three types of fish
- Bonny fish
- Cartilaginous fish
- Lung fish

Bonny fish

Examples of bonny fish are; Nile perch, Tilapia, herrings, trout, salmons.
- They have no eye lids.
- They have swim bladder which helps to keep them float or to sink.
- Their gills are protected by gill cover or operculum
- Their bodies are covered by overlapping scales.

Cartilaginous fish
- Their skin is tough and shinny
- They have gills slits instead of gill cover.
- They have mostly cartilage instead of bones in their skeletons
- They do not have swim bladder.

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Examples of cartilaginous fish

- Dog fish
- Skates
- Rays

Lung fish

- They breathe through gills in water and by swim bladder when gills cannot supply enough oxygen.
- They live in dirty pools, swamps or rivers.
- They have long and thin pelvic and pectoral fins.
- They hibernate in dry seasons.

Examples of lung fish

The common lung fish/mamba

- Epiceratodus
- Diponi

Breathing in fish

- Fish breathe in dissolved oxygen in water.
- Water containing oxygen moves through the mouth and passes out over the gills which absorb the oxygen in the water.
- Gill rackers trap solid particles or dirt to prevent damage to the gills.
- The gill bars are spread out the gills to prevent interlocking.
- Gill filaments are many in order to give large surface area to absorb a lot of oxygen dissolved in water for respiration.

Diagram

How is fish adopted to living in water?

- Its streamlined body helps it to move easily in water
- Fins help it to move in water and stop it from rolling.
- They have gills for breathing in water.
- They have lateral lines to detect sound waves (hearing) or danger.
- Their scales and colour provide protection.
- Its slippery scale protects it from predators and helps in reducing viscosity (friction in water)
- Some have electric organs which give out high voltage of electric shock to its enemy.
- Some fish inject poison into their enemies.

Uses of fish to man

- They are kept as pets in aquarium for decoration
- Their bones are used to make glue
- They are sources of employment e.g. fish mongers.

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- They can be used for research and learning.
- Some are used as medicine e.g. silver fish.

AMPHIBIANS

These are cold blooded vertebrates that can live both in water and on land

Characteristics of amphibians

- They are cold blooded vertebrates
- They reproduce by laying eggs
- They under go external fertilization i.e. the male sheds sperms on the eggs outside the female's body as they are being laid in water.
- They have no external ear lobes.
- Their eggs are usually laid in egg spawns.
- They have scaleless skin
- Their heart is three chambered.

Examples of amphibians

Frogs, toads, Newts, salamandas, axolotis, effs blind worm (ocaecellians)

Differences between a frog and a toad

- Frogs mostly live in water while toads mostly live on land.
- Frogs have smooth slippery skins while toads have warty rough skins.
- Toads lay eggs in long ribbon spawns while toads lay eggs in mass spawns.
- Frogs have fully webbed hind feet while toads have partly webbed feet.
- Frogs can breathe through their lungs and moist skin while toads breathe through their lungs.
- Tadpoles of frogs are brown while of toads are black.

Feeding in frogs

- They feed on small insects and worms
- They use their long sticky tongues to trap their prey.

Reproduction in amphibians

- The male and female mate.
- The female lays eggs and the male sheds sperms over them to fertilize them (external fertilization).
- The eggs develop and after about two weeks hatch into tadpoles.
- The tadpoles undergo several changes to full develop into an adult.
- This takes about three months.

Diagram to show life cycle of an amphibian

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INVERTEBRATES

These are animals with out a back bone.
They are multicelled animals.

Classes of invertebrates

- Coelenterates
- Echinoderms
- Sponges
- Worms
- Mollusks
- Arthropods

a) Coelenterates

- They have cylindrical bodies with only one opening which acts as the mouth and the anus.
- They have stinging cells on the tentacles surrounding the openings.
- They live in water.

Examples of coelenterates

- Corals
- Jelly fish
- Hydra
- Sea anemone.

b) Echinoderms

The have spiny skins and tube feet.
They pump liquid into their feet to make them expand.

Examples of Echinoderms

- Star fish
- Sea urchins
- Sea lilies
- Sea cucumbers

c) Sponges

- Sponges are a collection of individual cells organized into one body on the sea floor.
- They cannot move about but remain stuck on the sea floor.
- They suck in sea water and filter out tiny pieces of food.
- They breathe and feed through the holes in their bodies.

d) Molluscs

- These are invertebrates with soft and un segmented bodies covered by a protective shell or mantle.

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- They live on land and flesh water or salty water.
- Some mollusks do not have shells like octopus
- Mollusks reproduce by laying eggs.

Examples of mollusks
- Octopus and squids (the largest and most intelligent) .They move by jet propulsion
- Snails and Slugs
- Oysters
- Cuttle fish
- Clams
- Mussel

Snails live on land and water
They feed on plants, while others are carnivorous
Slugs are similar to snails but do not have shells.

Diagram showing snails and slugs

E) WORMS

- These are thin, long and soft bodied invertebrates.
- Some live in soil or water while others are parasites living inside other animals
- They breathe through their moist skins
- They lay eggs.

Groups /types of worms

- They are divided into three groups namely;
- Segmented worms (annelids)
- Round worms (nematodes)
- Flat worms (platy helminthes)

a) Segmented worms

These are worms whose bodies are divided into rings or segments.
They mostly live in soil and water.
Examples
- Leeches
- Bristle worms
- Earth worms
- They live in soil and eat soil or decayed vegetation.
- They are hermaphrodite i.e. has both male and female productive organs
- They help to aerate the soil by making tunnels which also help to improve soil drainage.
- They help in the formation of humus in the soil.

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Diagram showing common segmented worms

b) Flat worms

They have flattened and segmented bodies.
Many of them are parasites of man and other animals.
Examples of flat worms

- Tape worms
- Pond flat worms
- Liver flukes

Tape worms feed on digested food in the small intestines
Liver flukes suck blood from animals.
Diagram showing common flat worms

c) Round worms

- These are groups of worms with cylindrical bodies.
- Some are parasites in man and other animals and plants while others live in water.
- They are pointed on both ends.

Common examples of round worms

- Hook worms
- Eal worms
- Pin worms
- Thread worms
- Ascaris

- Hook worms enter our bodies by penetrating through the skin of bare feet.
- They feed on digested food in blood by sucking blood.
- They enter our bodies by drinking water which is contaminated with hook worms.
- Bathing water which is contaminated with hook worms.

F) ANTHROPODS

These are invertebrates with segmented and jointed legs.

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Characteristics of arthropods
- They have jointed legs
- They have hard external skeleton called exo-skeleton (cuticle)
- They can shed their cuticles through the process of molting if growth is to occur.
- They have segmented bodies.

Groups or classes of arthropods
- Myriapods
- Arachnids
- Crustaceans
- Insects

Myriapods
These are arthropods with many jointed legs.
Their bodies are segmented with each segment having atleast a pair of legs.
There are two groups of myriapods
1. Centipedes (chilopoda)
- These have one pair of legs in each segment and a pair of antennae
- The front legs are modified to form poison claws.
- They are carnivorous.

2. Millipedes (diplopoda)
These have two pairs of legs in each segment.
They curl or coil to protect themselves or produces bad smell.

Diagram showing common myriapods

b) Crustaceans
- These are arthropods which have hard and crust like exo-skeleton.
- They have jointed legs
- Their bodies are divided into two main parts i.e. the cephalothorax and the abdomen.
- They breathe through gills or their skin.

Examples crustaceans
- Crabs
- Cray fish
- Lobstars
- Prawns
- Sand hoppers

Uses of crustaceans
- They are eaten as food by man.
- Some are used as baits in fishing industry.

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c) Arachnids

These are arthropods with four pairs of legs and their bodies are divided into two main body parts. (cephalothorax and abdomen)

Examples of arachnids

Spiders

They have special organ at the end of their abdomen called spinnerettes for spinning their webs.
They breathe through book lungs
They use their webs for movement, building their nets, trapping their prey and finding their way back.
They reproduce by laying eggs.

ii. Ticks

They live on the skin of animals
They feed on blood
They spread many diseases in domestic animals e.g. East coast fever, red water, heart water, and typhus fever in humans.

iii. Scorpions

They have a large tail with a poisonous sting
Their front legs are modified into pincers
They do not lay eggs but give birth to young ones.

iv. Mites

Insects

These are arthropods with 3 (three) main body parts or jointed legs.

Characteristics of insects

- They have three main body parts (Head, thorax, abdomen)
- The head contains; compound eyes, mouth parts and feelers.
- The thorax carries three pairs of legs, the wings.
- The abdomen contains the spiracles, ovipositors and stings in some insects
- They have three pairs of jointed legs.
- They have an exo-skeleton called Cuticles
- They have a pair of feelers or antennae
- They have a pair of compound eyes
- They reproduce by laying eggs
- They breathe through spiracles.

Diagram showing parts of an insect

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Functions of parts of an insect

i. **Mouth parts**

Proboscis is a tube for sucking food in insects like mosquitoes, house flies, bees, tsetseflies etc.

Mandibles are used for chewing in insects like grasshoppers, locusts, cockroaches, beetles, etc

ii. **Antennae/ feelers**

These are used as sense organ for touch, smell detecting sound (hearing) and detecting changes in temperature, humidity and finding direction.

iii. Wings for flying

iv. Compound eyes for seeing

v. Halteres in housefly for balancing during flight.

vi. Spiracles for breathing

Life cycle of insects

There are two types of life cycle in insects

Complete metamorphosis

Incomplete metamorphosis

Complete metamorphosis

This is a life cycle of some insects which go through four stages of development namely;

Eggs – Larva – Pupa – Adult

Examples of insects which under go complete metamorphosis

- Houseflies
- Mosquitoes
- Butterflies
- Bees
- Moth
- Wasps

Life of a housefly

Adults lay eggs in batches of 100-150 eggs in manure heap, rotting bodies, exposed food or feaces.

The eggs hatch into larva called maggots after a day.

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NB: Some flies such as blue bottle fly hatch the eggs from inside the body and lay maggots.

- Maggots feed on decaying matter, grow quickly and turn into pupa after 4-6 days.
- The pupa does not feed but grows from inside the pupa a case called Cocoon.
- The adult crawls out of the pupa after about 4-5 days.

Diagram showing the life cycle of a housefly

Dangers/economic importance of houseflies

- They carry germs on their body, saliva or mouth parts, which cause the following diseases; diarrhea, dysentery, cholera, typhoid, trachoma, red eyes.
- They help to reduce the volume of feaces in latrines which get filled up quickly.

MOSQUITOES

There are three main types of mosquitoes namely anopheles, mosquito, Culex mosquito, aedes/ tigers mosquito.

i. Anopheles mosquitoes

Female anopheles mosquitoes spread a protozoan called plarmodia which causes malaria in man.
Culex mosquitoes spread worms called Filaria which causes elephantiasis
Aedes/ tiger mosquitoes spread a virus causes dengue fever and yellow fever in human beings.

Life history of mosquitoes

Adult mosquitoes lay eggs in stagnant water.
After 2-3 days the eggs hatch into larva called Wringlers which breathe through a spiracle on the tail end called Siphon.
The larva develop into called Tumblors which breathes through a pair of spiracles called breathing trumpets
After 2-3 weeks from eggs a fully grown adult comes out of the pupa.

Diagram showing life cycle of anopheles and culex mosquitoes

Difference between anopheles and culex mosquitoes

Anopheles	Culex

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Lays eggs with an air float	Lays eggs in crafts /custers
The larva lies parallel to the water surface when breathing.	The larva lies at an angle to the water when breathing.
Adult lies in a sloppy position when at rest/.	Adult lies horizontally when at rest.

Ways of controlling mosquitoes

- Drain stagnant water around homes.
- Burry old fins, broken pots, or bottles where mosquitoes can breed.
- Clear all bushes around homes where mosquitoes can hide
- Spray adult mosquitoes with insecticides
- Sleep under insecticide treated nets.
- Keep fish in dams or reserves of water to eat mosquitoes, larva.
- Close doors and windows early in the evening
- Apply repellants on the body to drive away mosquitoes
- Burn mosquito coils to clave away mosquitoes
- Plant trees /flowers that can repel mosquitoes in the compound.

Butterflies and moth

- They undergo complete metamorphosis
- Female lays eggs mainly on the underside of the leaves
- Eggs hatch into larva / caterpillars which feed on leaves
- The larva spins a cocoon around itself and changes into pupa/chrysalis which does not move or eat i.e. it is dormant.
- When the adult is full grown, it breaks the pupa case and comes out.

Advantages of butterflies and moths

- They help in pollinating flowers of farmer's crops.
- We get silk breads from the cocoons of some butterflies
- Caterpillars are eaten in some societies as food.

Disadvantages of butterflies and moths

- Their larva /caterpillars feed on leaves of crops / plants destroying them (crop pests)
- Caterpillars have bristle hairs which can burn and cause irritation itching or wounds o the skin.

Incomplete metamorphosis

This is a life cycle which involves three stages i.e.
Eggs – Nymph – Adult (imago)

The adult female lays eggs in the soil in an egg sac (pouch)

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After a few days the eggs hatch into Nymphs
After several changes / moulting, the nymph develops wings and becomes a fully adult.

Diagram showing incomplete metamorphosis

Examples of insects which undergo incomplete metamorphosis

i. Cockroaches
ii. Grasshoppers
iii. Ticks
Bed bugs
iv. Termites
v. Praying mantis
vi. Walking sticks
vii. Kaytidis
viii. Damselflies
ix. Dragon flies
x. White aunts
xi. Aphids
xii. Fleas

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Protoctista kingdom (single called organism)

- These are groups of very simple living organism which are single (unicellular one called.
- They have a nucleus enclosed in a membrane
- They are neither plants, fungi, nor animals.
- They live in fluids (liquids) or in other organisms because they do not have protection against drying.

Examples of protoctista
Algae
Euglena
PROTOZOA

a) Algae

- They have chlorophyll and make their own food
- They mostly reproduce by means of spores.
- They do not have roots, stems and leaves.
- They appear in different colours e.g. blue, green, red.
- They grow on and within the soil, wood, moist rocks.

Examples of algae

- Spirogyra
- Sea weeds
- Focus

Uses of algae

- It is used as food by man and other animals such as fish.
- They add oxygen to water which is breathed in by water animals.
- They are used in making fertilizers
- Protozoa
- These are groups of single celled organisms which have a nucleus and the cytoplasm.
- They do not have chlorophyll but capture their food or engulfing using pseudopodia
- They are microscopic
- They are found in water and o land in damp places and in body of animals as parasites.
- They reproduce by means of pseudopodia e.g. amoeba while other by cilia e.g. paramecium

Examples of protozoa

- Amoeba
- Paramecium
- Plasmodium

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- Trypanosome

Illustration of amoeba and paramecium

c) Euglena

- This is a unicellular organism which has both plants and animal features.
- It has chlorophyll and produces its own food.
- It can move from one place to another very quickly for protection like an animal using its flagellum.
- It is microscopic and lives in ditches and ponds.

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.

Why farmers rear cattle

- For meet 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.

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The major types of cattle kept in Uganda include;

- Beef Cattle
- Dairy Cattle
- Dual purpose Cattle

Types of breeds of cattle

A bred is a family of cattle having specific characteristics of a 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.
- They require less care.
- 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 mature fast
- They produce high quality meat

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

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- 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
- Charolait
- 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.

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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).

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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 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

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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 estrus 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.

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- 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.

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

The reproductive system of a cow.

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

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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

Epidermis
It manufactures 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

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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.

Dry period
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 colostrums.
- It prevents low birth weight.
- It prolongs milk let down.

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

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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.

Colostrums

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

Uses of colostrums

- 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) Gruding

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

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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 no 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.
- It increases space in the Krael/Many animals can be kept in a small space.

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- 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 f 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.
The sperms are then sealed by burning using a hot metal.

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

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Advantages of castration

- It prevents unwanted pregnancies.
- 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 random mating.

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. Dosing

Drenching

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

Diagram of a drenching gun

Dosing /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 knap sack sprayer or spray race.

Dusting

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

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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 removal 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 remove milk from the udder of a cow.
The parts of a milking machine must be washed to avoid milk contamination.

Diagram illustrating machine milking

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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 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

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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	Whey
Casein		

CASEIN

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

Why

This is the liquid part left after sour milk has been 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.

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- 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,

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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

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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 com)

Bacterial action continues here. Foreign bodies are retained here.

Omasum

It churns and grinds food into fine particles
Water is absorbed here also.

Abomasums (true stomach)

Digestion by enzymes takes place here.
NB; from abomasums to the rectum, digestion is the same as in non ruminants.

Types of food stuffs

Roughages
Concentrates
Additives

Roughages

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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
- Blood hides
- Bones
- Cattle dung
- Milk
- Horns and hooves
- Cattle dung and urine.

GRAZING
Grazing is the proper use of grass land by animals
- Systems of grazing
- Herding/free range/open grazing
- Rotational grazing
- Zero grazing

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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) Pad docking
ii) Strip grazing
iii) Tethering

- 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.

Advantages of paddock grazing

- Paddock grazing allows proper use of pasture.
- It gives the farmer time to do other activities.
- Manure is evenly distributed on the farm.

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- 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 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.

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- 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 brought.
- 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 haw on the body.
- The animal coughs and sneezes

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- There is diarrhea.
- The animal has difficult 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 haw 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 e.g.
- Anthrax
- This is caused by bacillus anthracis bacterium.
- It is an acute infectious disease which attacks cattle, sheep, goats, pigs and humans.

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.

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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 diarrhea
- Dullness and less 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 stays etc.
- Avoid damp wet conditions
- Treat 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

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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 (contagious abortion /bangs)
- 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)

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Prevention and control
- Cull and slaughter the infected animal.
- Vaccinate all young females especially cattle.
- Don't touch aborted fetus 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
- 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.

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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.

Signs and symptoms of Red water

- High temperature
- Constipation and dullness
- Animal becomes anemic
- Animal licks soil
- Presence of red blood pigments in the urine.

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- 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 anemic
- The temperature may fall.

NAGANA (TRYPANOSOMAISIS)
- 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

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- 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
This is a protozoan disease transmitted by brown ticks and red legged ticks i.e. tick borne disease. It attacks cattle, goats and sheep.

Prevention and control
Isolate sick animals
Cull and slaughter the infected animals
Use coccidiostants in feeds and 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;

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i) External Parasites/Ecto parasites
ii) Internal Parasites/Endo parasites

External Parasites
External parasites are parasites that live on the 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

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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.

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.

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Types of resources

1. Non renewable resources
2. Renewable resources

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 non-renewable resource.

How is soil used as a resource?

It is used for growing crops
Soil is used for building houses
It is used for building towns and cities

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

d) Sun

It is a renewable resource

How the sun is used as a resource

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- 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

Rocks and minerals

A mineral is any thing that occurs naturally like a rock in the earth.

Examples of minerals

- Oil
- 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

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- Fossils are remains of plants and animals living 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.

<u>Uses of fossils</u>
- 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.
Soider	Lead and Tin	- Joining metals

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

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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 resistively of metals.

FUELS

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

Examples of fuels

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

- Fire wood and charcoal are renewable resources while 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.
- 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 which lived long ago and were buried due to heat and pressure they changed to oil.

<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 cloths while sisal and jute are used to make ropes.
- Some plants are used as herbal medicine to cure certain diseases.

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- 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 cloths, 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.

Conservation of resources

- Conservation is the protection and preservation 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 habitant through the Uganda Wildlife

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Authority (UWA).

- A habitant 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.
- Afforestation should be practiced.
- Swamps and wetlands should be declared restricted areas.

RESPIRATION

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 are the lungs.

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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.

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.

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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 expand.

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 contract.

Diseases that attack the breathing/respiratory system.

Tuberculosis
Influenza
Diphtheria
Emphysema
Bronchitis
Asthma
Pneumonia
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.

Disorders of the respiratory system
Choking

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Hicap
Sneezing etc

SCIENCE AT HOME AND COMMUNITY

Water

Water is a colourless liquid substance made up of hydrogen and oxygen gases. These gases are in the ratio of 2:1 (H_2O)

Sources of water

- Rain water
- Artesian wells
- Hot springs
- Streams, lakes, rivers, swamps, ponds, oceans, and seas.

Properties of pure water

- It is colourless
- It is without suspended matter like germs.
- It has no smell
- Pure water is tasteless
- Pure water boils at 100^{o}C (212^{o}F) and trees at 0^{o}C (32^{o}F) at sea level.
- Pure water forms lather (foam) very easily) with soap.

Uses of water to the body

- Used for bathing
- Water makes up part of blood as plasma
- Helps to dissolve the digested food for easy absorption in the body.
- Maintains the shape of body cells.
- Cools the body in form of sweat when it evaporates.
- Helps in formation of body fluids such as tears, saliva, urine, sweat etc.

Other uses of water

- For domestic use e.g. cooking, washing etc
- For drinking by man, mammals, and birds
- For irrigation in agriculture
- Used in industries for cooling, washing machines and raw materials.
- Used to generate hydro-electricity
- Used by plants for photosynthesis

Preparation of safe water for drinking

i. Boiling

When water is heated, it boils, to a temperature of 100^{o}C (212^{o}F) this temperature kills germs.

ii. Filtering

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This is the process by which a clean or sterilized piece of cloth or local water filter.

Examples of solid impurities filtered are dirt, soil, stones, leaves, animals wastes etc.

NB: Filtered water is not safe for drinking because it may be containing some germs.

iii. Treatment of water

Treatment of water is when chemicals are added to kill germs in it.

Advantages of chemicals used in water treatment

The chemicals kill germs in water

Disadvantages of using chemicals

- They are expensive
- They do not make water clear
- They add some smell and taste to water.

DECANTING

Decanting is a method of removing large particles of objects from water.
Decanting is done by pouring water slowly from one container to another so that heavily particles are left behind. In this method, the three pot system is used to purify the water.

Experiment of the three pot system

Procedures

Get three containers (pots) name them 1,2 and 3.
Get dirty water and pour into the first port and leave it to settle for a day. After one day, all the dirty particles will have settled at the bottom of the first container (pot)
On the second day, change water in to the second pot and also on the third day, when the three days are over, get the water and boil to make it safe for drinking.

Materials which make water impure

- Human wastes such as urine and feaces.
- Animal wastes such as urine and feaces
- Chemicals such as herbicides, insecticides
- Silt from soil erosion.

Industrial waste such as used oil cleaning clothes in a home

- Sorting
- Soaking
- Washing
- Rinsing
- Wriggling
- Drying
- Ironing

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ACCIDENTS AND FIRST AID

What is an accident?

An accident is a sudden happening that cause harm to the body.
Accidents can take place anywhere.
They may happen at home, school, place of work, where we go for prayers, on the pitch etc.

First aid

This is the first help given to a casuality before he/she is taken to hospital. a casuality is a person who has got an accident.

Burns

These are body injuries caused by heat.

Types of burns

1. Burns
2. Scalds

Burns and scalds

Burns are injuries caused by dry heat.

Causes of burns

a. Hot metals
b. Hot flat iron
c. Acids
d. Glowing charcoal
e. Hot charcoal stove
f. Fire

Degree of burns

Burns and scalds are described using the word degree to tell how severe they are;
There are three types of degrees of burns. These are;

a) First degree burns
b) Second degree burns
c) Third degree burns

First degree burns

These are minor burns which do not form blisters.
A blister is a raised skin with a liquid under neath.
The skin is tender for several days
The skin is unbroken.

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First aid
Put the burnt area in cool water immediately after the accident.

Why?
To reduce the temperature of the burnt part.
N.B; First degree burns need no dressing.

Second degree burns
These are burns which form blisters.
They are severe than first degree burns.

Signs of second degree burns
a) Blister are formed
b) Unbroken blisters

FIRST AID
If the blister is broken, wash the area with clean water and soap.
Cover the skin with a bandage or clean cloth.

NB; It is not good to break the blister because it may lead to infection of the wound by germs. Fats, oil, coffee, herbs or drug should never be put on the burn because they can cause infection.

Sugar should not be put on the burn because it attracts houseflies which bring germs to the wound.
The victim of the second degree burns should be given plenty of fluids to drink.

Third degree burns
There are burns which cause deep burning of the skin.
The skin is burnt deeply and it appears shinny white.
a) The skin is burnt deeply

FIRST AID
Put the burn areas in cool water.
Encourage the casuality to drink a lot of fluids.
NB: Patients of second and third degree burns should be given a lot of fluids to drink.

Why?
They lose a lot of fluids through the burnt skin by evaporation

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Prevention of burns and scalds
- Use heat insulators to handle hot objects.
- Cooking from raised places
- Keep petroleum products out of reach of children.
- Do not allow young children to cook.
- Refill lanterns or lamps after putting them off.
- Teach children the dangers of burns
- Tell children to play away from fire places.

Fever and convulsions
Fever is the condition of the body when its temperature goes beyond the normal.
The normal body temperature is 37^{o}C or 98.H^{o}F.
Fever is not an illness but a symptom of many illnesses such as malaria, typhoid, measles.

Effect of fever
It can lead to convulsions

Convulsions
These are uncontrollable jerky movements of the body.
Convulsions can be stopped if the disease causing them is treated.

First aid for convulsions
- Remove all tight clothes from the body of the victim.
- Put an object in the mouth of the victim to stop him from biting the tongue.
- Give the victim plenty of cold drinks
- Take the patient to hospital

First aid for fever
Carry out torpid sponging (cold compress).
A wet cloth is put on the forehead or chest of a victim.

Caution
Do not use very cold water because it leads to convulsions.

Fainting
It is the loss of consciousness for a short time

Main cause of fainting
Reduced supply of blood rich in oxygen and food to the brain.

Conditions that can lead to fainting
- Anxiety
- Heavy body exercises
- Extreme sorrow (sad news)

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fear
- Prolonged hunger

FIRST AID
- Put the victim in open air.
- Remove tight clothings around the neck and chest to enable the victim get enough oxygen.
- Rinse the legs of the victim higher than the head.

Why?
To allow blood flow faster to the brain.
Don't allow the victim to be over crowded

DROWNING
This means dying as a result of having lungs filled water.
Drowning has no first aid since the victim dies.

Near drowning
It is temporary loss of breath due to having one's lungs filled with water.
A person who has nearly
Drowned has only four minutes to live therefore a first aider must be very fast to save his life.

First Aid
Re move the victim quickly from water
Shout for help
Lie the person on his back.
Carry out mouth to mouth breathing (kiss of life)

How to carry out mouth to mouth respiration
- Make the victim to lie on his back
- Tilt the head backwards and keep his mouth opened
- Remove any object stuck in the mouth
- Press the victim's nostrils with your fingers to close them
- Put your mouth directly into the mouth so that the chest rises.
- Stop a bit to let the air out and blow again
- Repeat this many times (about 15 times in a minute)
- Continue the steps until the victim can breathe again by himself.
- Place the heels of your hands between the navel and the ribs of the victim
- Make a quick strong push forward into the ribcage.

How to prevent near drowning
- Acquire swimming skills
- Always empty bath tubs

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- Covering all septic tanks
- Putting on a life jacket when traveling on water.
- Fencing pits that builders used to trap water
- Do not allow children to go near water sources without adults
- Do not allow babies to play in basins full of water.

Common drowning places
- Swimming pool
- Ponds
- Streams
- Lakes
- Wells
- Seas and oceans
- Bath tubs

Nose bleeding
This is the flow of blood from the nose.

Causes
- Over inhalation of dry air
- Over blowing or one's nose with cold
- Taking foods one's body is allergic to.
- Taking medications for a long time (aspirin, garlic, ginger)
- Over inhalation of dry air dries the blood vessels in the nostrils and they break.
- Over blowing the nose over strains the blood vessels in the nostrils and they break.
- Taking aspirin, garlic, and ginger prevents normal blood clotting and instead thin the blood.

First Aid
- Let the causality sit and bend forward.
- Pinch the upper side of the nostrils.
- Encourage the causality to breathe through the mouth to prevent over straining the blood vessels.
- Keep the head of the victim higher than the level of the heart.
- Put the ice wrapped in a towel on the nose and check

Why?
To make the lining of blood vessels in the nostrils moist.
NB: do not make the causality to lean back because it allows blood to flow back to the throat which may cause vomiting or irritation.

Prevention
- Keeping the nostrils moist

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- Taking citrus fruits such as oranges and lemons to strengthen the lining of blood vessels.
- Taking foods one is not allergic to.

Foreign bodies
A foreign body is any unwanted matter that enters the body.

A foreign body may enter the body through the;
- Nose
- Mouth
- Anus
- Eye
- Ears
- Vagina

Examples of foreign bodies
Insects
Small stones
Seeds (coffee, berries, beans, g.nuts)
Dirty or dust
Soil

Foreign body in the eye
Objects that enter in the eye include; dust, small insects, soil.

First Aid
Wash the eye with plenty of clean water.
Use the corner of a soft piece of cloth to remove the foreign body.
Take the victim to the oculist.

Foreign body in the ear
Examples
Small insects
Small seeds
Small stones

First Aid
- Make the victim sit and bend the head to one side.
- If it is an insect, pour clean water in the ear for the insect to float and come out.
- Flash light at the entrance of the ear if the foreign body is an insect.
- Take the victim to the hospital

Foreign body in the nose
Foreign bodies in the nose include;
- Small insects

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- Small seeds
- Small stones

First Aid
Tell the victim to blow his nose hard and fast.
Take the casuality to the health worker.

Foreign body in the throat
Foreign body in the throat are mainly large pieces of food.
Foreign body in the throat lead to choking and death.

First aid
- Give the victim a number of sharp blows in the back
- Wrap your arms around his waist and press the belly upwards strongly.
- If the victim is unconscious, lie him on his back and make several sudden pushes on the belly using heels of your hands.
- It the person does not breathe, try mouth to mouth breathing.
- Take the victim to hospital
- If the victim is smaller than you, turn him over your folded leg and give sharp blows at the back.

Preventing accidents caused by foreign bodies
- Chew food properly
- Do not talk or laugh when eating
- Keep beads, button, coins, and seeds out of reach of children
- Putting on glasses while moving on motorcycles and bicycles
- Teach children not to put seeds, coins, stones, and soil in their eyes, nose, ears, and mouth.

Poisoning
Poison is any substance once taken into the body damages health or cause death.

Ways poison can be introduced into the body
- Through food
- Through air
- Through animal/bites (snakes, rapid dogs)
- Through injections
- Through swallowing (orally)

Common house hold poisons
Paraffin	herbicides
Root poison	Jik
Petrol	Insecticides
Wormcides	Diesel

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Acaricides Drugs (Aspirin/ chloriqune)

Signs of poisoning

- Rapid breathing
- Fever and sweating
- Feeling thirsty
- Mental confusion
- Comma
- Vomiting
- Loss of balance

First Aid

Give the casuality a lot of drinks.

Why?
To dilute poison in the stomach
Make the person vomit.

How to make the person to vomit

- Placing the finger in the mouth or throat.
- Give the victim water mixed with soap
- Rush the victim to the hospital

NB: If the causality has taken paraffin, petrol, or bleach (Jik), do not make him vomit.

Why?
It causes more damage to the stomach and gullet.

Preventing poisoning

- Keep petrol, paraffin out of reach of children
- Keep drugs out of reach of children
- Follow the doctor's prescription
- Buy drugs from recommended pharmacies
- Dispose expired drugs.
- Avoid drugs misuse

The ABC technique followed before giving first AID

A- Air way
B- Breathing
C- Circulation

TOPICAL QUESTIONS

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1. Mention the main reason for giving first aid
2. Distinguish burns and scald.
3. How is the cause of burns similar to that of scalds?
4. Why should a burnt hand of a victim be dipped in cool running water?
5. Why is it not advisable to break blisters on the skin?
6. How do heat insulators prevent burns and scalds?
7. Define fever.
8. List down the main effect of fever.
9. Explain the first aid you can give a person who has fever.
10. How would you help a person who has convulsion?
11. What is fainting?
12. State the main cause of fainting?
13. How does drowning differ from near drowning?
14. Why should patients of second and third degree burns be given a lot of drinks?
15. Give one difference between first degree burns and third degree burns.
16. Why is it not good to make the victim who is nose bleeding to face up.
17. How does a foreign body in the throat cause choking?
18. Why would you give plenty of drinks to a person who has taken poison?
19. Why is it dangerous to make a person who has drunk paraffin to vomit?
20. Mention one way of preventing poisoning at home.

SANITATION

Definition:

Sanitation is the general cleanliness of a place where we live.

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Ways of maintaining sanitation

- Construction of latrines or toilets for proper disposal of wastes.
- Digging rubbish pits and providing dust bins for proper disposal of house hold refuse.
- Slashing bushes around the homes.
- Draining away all stagnant water to deny mosquitoes breeding and protecting water sources.

Constructing a latrine or toilet

A latrine is pit dug in the ground where human excreta is deposited.

Uses of latrines

They keep faeces and urine where vectors cannot bring them to our food.

Types of latrines

i) Pit latrine
ii) Toilets
iii) Potties

Pit Latrines

Qualities of a well built latrine

- It should be 5 to 7 metres deep
- The floor should be strong enough to stand on and smooth to sweep and clean.
- It should have a hole big enough to allow faeces and urine to pass and small enough to prevent children from falling inside.
- It should have walls and doors to provide privacy to the user.
- It should have a lid to cover the hole.

NB: Covering controls smell and the movement of flies is controlled.

- It should be constructed 10 metres away from the main house and 30 metres from the water source.
- It should be built below the water table or source to avoid contamination.

Site of a pit latrine

- It should be atleast 10 metres from a living house to prevent flies from carrying germs on to food.
- It should be atleast 30 metres away from a water source (water table) to prevent feaces and urine seeping in to water source and contaminate it.
- It sinking rainy seasons
- Should not be built above the water table to prevent the feaces and urine going into and contaminate.

Types of Pit latrine

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i) Ordinary pit latrine
ii) VIP latrines

Ordinary pit latrine
It is common in villages
It should have a lid to cover the hole.

The VIP latrine
It is a special type of a latrine with a vent pipe to take out smell and a screen on top to trap flies.

Important features of a VIP latrine
- Vent pipe: it lets out air.
- Screen on top: traps flies
- Spiral shaped walls no doors for free circulation of air.
- It has no lid to let in air

How to construct a VIP latrine
- It should be at least 10 metres away from any school, house, kitchen, and other buildings
- It should be 30 metres away from any water source.
- It should be built on solid ground and not in valleys or swamps.
- Dig a pit of about 5-10 metres deep

Cover the pit in any of the following ways;
i. Use strong poles of hard timbers
ii. Metal bars
iii. Build a house on top of the pit
fix a net or screen on top of the vent pipe.
Place the pipe in its hole.

How to maintain a VIP latrine
- The floor should be swept or washed if it's cemented.
- Wash or remove any feaces, insects, cobwebs and dust from walls and corners of the roof
- Trim grass and bushes around the latrine
- While using a latrine, make sure that the feaces go directly into the hole.
- Clean with any soft tissue or leaves
- Wash your hands with soap after using the latrine.

Toilets (water closet system)
This is a bowl shaped device used for disposing human waste, which is flushed away the bowl by water from a tank (cistern).

Components of a flush toilet system

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Parts include;

i. A tank that stores water for flushing
ii. A seat with a cover for sitting.
iii. A pipe that takes water from the tank to the bowl and another that takes it to septic tank.
iv. A septic tank, an underground storage hole for human waste and waste water from kitchen and bathroom (i.e.Sewage)
    The waste materials in the septic tanks are called sewage.
    Sewage from septic tanks may be carried away by pipes (sewers) for treatment to make it less harm.
    Where there is no pipe system, it is carried using vehicles called cesspool empties.
    In Uganda, collection and treatment of sewage from homes and institutions is done by National water and sewage corporation (NSWSC).
v. The lever is either pulled or pushed top release water during flushing.

Flush toilets are commonly used in cities, towns and other places where there is piped water.

Advantages

- Can be put inside the house and vehicles
- They are easy to clean
- They are user friendly, even young children can use them.

Disadvantages

- They are very expensive
- They require a lot of water to function
- They are only used where there is piped water.
- They can easily get blocked if hard objects are put in it.

How to maintain flush toilets

- Keep the seat clean, do not step or urinate in them.
- Flush toilets after use.
- Use only soft tissue or toilet paper after cleaning your self.
- Do not use the toilet when it is blocked.

GROWTH, DEVELOPMENT AND REPRODUCTION

Growth is an increase in size e.g. changes from larva to adult.
Development refers to growing gradually and becoming more mature.

Reproduction

This is the process by which all living things multiply and increase in number (become

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many) i.e. give rise to new off-springs (young ones) to continue a generation of the species.

Types of reproduction
There are two types of reproduction
i) A sexual reproduction
ii) Sexual reproduction

A Sexual reproduction
This is the type of reproduction where no reproductive cells (gametes) are used to produce young ones.

Examples of a sexual reproduction
Vegetation propagation in plants e.g. budding, grafting, layering, marcoting, stem cutting, sulkers, bulbs crown, slips, leaves, and root cutting, cell division, binary fission in single celled animals e.g. Amoeba, bacteria, paramecium.

Sexual reproduction
This is the type of reproduction which involves joining (fussing) or two reproductive cells, male and female gametes.
The union /fission of a male female gametes is called fertilization.
The nuclei of the two cells unite and form a Zygote develops into a new individual or foetus.
In animals, the male reproductive cells (gametes) are called sperms and are produced by the reproductive organs called testes.
The female reproductive cells are called Ova and are produced by the ovaries.

Hermaphrodites
These are animals that contain (have) both male and female reproductive organs (Testes and Ovaries) on themselves. E.g. earth worms and snails.

Types of fertilization
There are two types of fertilization
i) External fertilization
ii) Internal fertilization

External fertilization
This is where the female lays eggs and the male pours sperms on them outside the mother's body to fertilize them e.g. fish and amphibians.

Internal fertilization
This is when eggs are fertilized inside the mother's body after mating.

Human sexual reproduction
Diagram showing the cross section of the female reproductive organs (system)

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The female reproductive organs and their functions
The Ovary: there are two ovaries. One on the left and another on the right. Ovaries produce ova (ovum) the female reproductive cells.
Oviduct (fallopian tube): it is the tube down the uterus (womb) from the ovary. It is the passage for an ovum to the uterus. This is when fertilization takes place.
Uterus (womb): it is a bag like structure inside which the foetus or Zygote grows from.
Cervix: This is a ring of muscle which helps to close the lower end of the uterus to the vagina there by protecting it /foetus from external damage.

The structure of gametes

i) Female gamete (an Ovum)
ii) Male gamete (sperm)

The structure of male reproductive organ

Functions of parts of the male reproductive organ
Scrotum: it is a sac or bag that encloses and protects the testes.
Testes: these are glands that produce the male seminal fluids containing sperms; They lie outside the abdominal cavity to make them have lower temperature than the normal body temperature for maximum production of sperm; They start producing sperm cells during adolescence from age 11-16years
Epididymis: it is a long coiled tube which stores and then carries sperms.
Sperm duct: It is an extension of the epididymis and delivers the sperms to the urethra where they pass and go out.
Portare gland: produce a fluid (seminal fluid) which helps to neutralize (make harmless/ the acid in urine in the urethra. It also kill germs which are in sperms.
Seminal vesicles: it stores excess sperms.
Erectile tissue (penis): it is a spongy tissue which when filled with blood it erects (stands) to ejaculate sperms.

Ovulation
This is when mature ova are released from the ovary.
An ovary releases an ovum every month i.e. the release of ova is done alternately.

Menstruation
This is the monthly release of blood from uterus as a result of rupture of the uterus

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walls.
This helps to was and clean the uterus in preparation to receive a foetus.
NB:
The first menstruation called menarebe starts in girls between the age of 9-15 years.
The last menstruation period end at around 45 years and is called menopause
Normal menstruation takes 3-4 days.
It takes place after every 28 days if all conditions are normal.
It may be interrupted by conception, strong fever, or any abnormalities in the body.

Care during menstruation

- To prevent infection and avoid germs, diseases, one must be clean.
- Use sanitary materials such as tampax, tampons, always, cotton.
- Visit health workers incase abnormalities are noted.

Fertilization

- Fertilization takes place in the oviduct /fallopian tube.
- Immediately after fertilization, the zygote moves to the uterus.
- The zygote attaches itself on to the placenta with the help of an umbilical cord, this process is called implantation.
- The placenta supplies the embryo with food nutrients and oxygen at the same time it removes waste products.
- The umbilical cord transports food to the foetus and waste products from the foetus to the placenta to be carried away by blood.
- The period of pregnancy from conception to birth is called gestation period and lasts for 9 months in humans.
- Development of the foetus takes place in the uterus.
- The ammotic fluid act as shock absorber and protect the foetus.
- The amnion/ amniotic membrane protects the body and had the fluids.

The stages of development are;
Fertilization - Zygote - Foetus - baby
Diagram showing development of the foetus in uterus
Sex determination
Sex of a child is determined by chromosomes found on the gametes/ sex cells, there are X and Y chromosomes XX chromosomes are for girls and XY for boys.

Signs of pregnancy (good and Bad)

- Requirement s of an expectant mother (pregnant mother)
- Good diet (balanced diet) for proper growth of the baby.
- Should avoid taking drugs like tobacco and alcohol.
- Should visit antenatal clinic for medical check up and advice.
- Should rake vaccine against tetanus (texonus toxed)

BIRTH AND LABOUR

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After nine months of pregnancy, the mother will go into labour and produce a child.
This is called giving birth or partyrition (child birth).
Labour refers to the effort of child birth shown by antraintions of the uterus.

What makes a baby after birth cry?
It is due to sudden change in temperature (environment change). Crying helps to start the normal functioning of the lungs i.e. breathing starts at birth.
NB: incase a baby fails to cry/breathe artificial breathing should be done immediately.
Single child birth: this is when one child is normally born to mother.
Multiple birth: this is when two or more babies are born at the same time.
Twin: when two babies are born at the same time by the mother.

Twins
Identical twins
This is when one fertilized ovum divides normally and grows into two separate babies.
Identical twins are usually same sex
All their physical aspects are the same.

Siamese twins
These are twins whose body remained joined /fused at one point.

Fraternal twins
This is when two ova are released and fertilized and then develop into twins fraternal twins are not always the same sex.

Multiple birth
If there are three or more ova released and fertilized it results into multiple birth.

Examples of multiple births
Triplets: Three children are born
Quadruplets: Four children are born.

Birth Control Contraception
This is a method of avoiding getting many children you can not care for properly i.e. having the number of children you want and when you want them.

Family planning
This is the use of birth control methods to get the number of children you want and when to have them in family.

Child spacing
This is the provision of enough time between the birth of the different children in family.

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Functions of family planning association

- It educates people about child spacing
- Educates people about quality of life when children are few
- Provides people with family planning contraceptives.

Reasons why people have many children

- Ignorance of family planning methods.
- High infant mortality rare
- Traditional practices and values (customs)
- Prestige or fame and security.

Problems of having many children

- If a family has too many children, there will be;
- Inadequate financial resources.
- Lack of enough food for the children
- Poor education for children
- Lack of proper medical care
- High infant mortality rare
- Mothers sickness as a result of having too many children e.g. miscarriage, maternal anemia, fatigue, low birth etc.

How to avoid infant mortality rate (death)

- Immunization against infant killer diseases.
- Participating in health care services e.g. health education
- Practice family planning.

Advantages of family planning

- Immunization against infant killer diseases
- It reduces risk of serious disease and maternal death.
- It reduces cases of abortion/miscarriages
- It improves the health and well being of the family.
- Controls population growth.

Methods of birth control

There are two methods used for birth control namely;

i) Natural Methods
ii) Artificial methods

Natural methods

- Abstaining from sex
- Withdrawal/pulling out before releasing sperms during sex
- Bed separation by couples

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- Prolonged breast feeding
- The mucus method (testing Jell)
- Using calendar or moon beads.

Artificial methods
- Use of condoms
- Use of contraceptive pills
- Birth control injections e.g. injectaplan,
- Intra uterino devices e.g. coils, spirals, diaphragm.
- Use of jellies and foams
- Sterilization by vasectomy in men and tube litigation
- Using norplant

Changes during adolescence and puberty
Adolescence
Adolescence is a period of development changes between child hood and adult hood.
A person at this stage is called an adolescent.

Puberty
This is the period of physical mental and sexual maturity i.e. when becomes a young adult capable of producing.
Changes in adolescents at puberty are called sex characteristics

There are three types namely;
i) Primary sex characteristics
ii) Secondary sex characteristics
iii) Emotional /psychological sex characteristics

Primary sex education (Basic)
This involves the development of sexual organs for reproduction.

Primary sex characteristics in boys
Penis and testicles enlarge (increase in size)
The testicles start producing sperms (boys begin experiencing wet dreams.
Internal organs begin producing fluid like semen.

Primary sex characteristics in girls
Thickening of uterus walls
Menstruation begins
Ovaries develop and start releasing eggs (ovulation starts)

Secondary sex characteristics (physical)
These involve the physical development of the body parts.

Secondary sex characteristics in boys

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- Voice breaks and deepens
- Hair grows on different parts of the body e.g. penis, armpits, chest, around the mouth and anus.
- Bones and muscles enlarge i.e. a boy becomes muscular.
- Sweat glands become more active.

Secondary sex characteristics in girls
- Breasts enlarge and looks tender and attractive
- Sweat glands become active making the face look smooth
- The hip (pelvis) enlarge and a girl puts on a lot of weight.

Fungi
Protozoa
Endo parasites
They affect a person through a number of ways causing a lot of pain and suffering

AIDS
The term AIDS stands for; Acquired Immune Deficiency Syndromes
Acquired means got from outside the body
Immune means protected against or safe from disease, the body is always protected by white blood cells.
Deficiency means lack or shortage or AIDS virus destroys white blood cells and the body has shortage or shem.
Syndromes mean a collection or group of diseases and signs which show the presence of a disease.
AIDS is a pattern of disease symptoms which attach and destroy white blood cells leaving the body unprotected against infections.

Causes of AIDS
AIDS is caused by aretgro-virus called HIV (Human Immunodeficiency Virus) commonly called AIDS virus.

Transmission of AIDS virus
- AIDS virus can only survive in the human body.
- The disease can be spread when body fluids of an infected person get into contact wit that of the health person.
- Body fluids can be exchanged in the following ways;
- Sexual contacts with an infected person.
- Blood transfusion from an infected person.
- Sharing or using sharp cutting instruments
- From an infected pregnant mother to her newly born baby at birth.
- From the mother to the baby through breast feeding.

AIDS virus can not spread by;

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- Normal shaking of hands
- Bites from mosquitoes and bed bugs
- Caring for AIDS patients
- Sharing cattery and cooking utensils
- Hugging or embracing AIDS patients
- Cleaning, washing beddings and clothing of people with HIV/AIDS

Signs and symptoms of HIV/AIDS

Signs

- The major signs of AIDS are;
- Herpes zoster locally called “Kisip” which inflames the skin making it appear as sealed.
- Chronic diarrhea which may last for more than a week
- Sudden less of about 10% of the normal body weight.
- Skin cancer which is also called Kaposis scarcomer, it causes itching and leads to scratching that leaves black spots.
- Swollen lymph glands especially those of the neck and armpits
- Oral thrush where by the tongue, gums, lips, and inside of the mouth plus the alimentary canal
- Chronic cough which lasts long.

Symptoms

- Tiredness without any proper cause
- General body weakness
- Persistent fever which is on and off
- Loss of appetite
- Sexually active people between the ages of 15-45years
- Rape and defilement victims
- Long distant truck drivers and traders who often have casual sex when away from their married partners for along time.
- Prostitutes who sell themselves for sex to many partners.
- Bar attendants.

Effects of AIDS/HIV

- These are many effects of HIV/AIDS on infected person, family and community.
- They suffer personal pain from the disease.
- The family spends a lot of money on treatment, care and feeding.
- They are stigmatized or isolated in the society.
- Loss of family income if the bread winner dies.
- Many children are orphaned and become child parents.

Prevention and control of HIV/AIDS

- There is currently no cure against AIDS, so people need to guard themselves against

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the disease by;

- ABC approach
- Having one faithful sexual partner
- Abstain from sexual intercourse until marriage
- Avoid practices which involve risks of getting AIDS like tattooing, ear piercing.
- Use of condoms during sex.
- Screening blood before marriage and transfusion
- Sterling medical instruments.
- Disposing syringes and needles after use.

How can we and manage AIDS patients

- People with AIDS need support in many ways.
- Counseling, is a special form of communication through which a person is helped to control his/her feelings by a counselor.
- Eating a balanced diet.
- Join good social groups to relax and avoid heavy work.
- Should give up bad habits like smoking and drinking alcohol

Types of counseling

- Pre-HIV antibody test counseling
- Pest-HIV antibody test counseling
- Counseling HIV/AIDS patients
- Importance of counseling
- It prevents AIDS victims from committing suicide
- Avoids spread of the disease to others knowingly.
- To encourage people to continue to live longer and useful.

Organization in Uganda that offers counseling services

In Uganda, there are many governmental organizations which offer counseling.
TASO: The AIDS Support Organization. It also provide supplements food for patients.
AIC: AIDS Information Centre
ACP: AIDS Control Programme of ministry of health. It also provides HIV/AIDS testing.

Gonorrhea

- It is a venereal disease caused by a bacterium called gonococci (sing gonococcus)
- It is spread through unprotected sexual intercourse with an infected person.

Signs in men

- Pain when urinating
- Discharge of pas from the penis
- Painful swelling on the testicles
- Rash and sores on the genital areas

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Signs in women
- Slight pain when urinating
- Sometimes very painful monthly periods.
- Vaginal discharge of smelly pas
- Pain in the lower abdomen.

Signs in babies
- Red and swollen eyes
- Pus comes out of the baby eyes
- Blindness.

Effects of gonorrhea
- It leads to permanent damage of male and female reproductive organs.
- Leads to sterility in both men and women.
- Cause blindness in babies.
- Blecks the urethra making urination difficult and painful.

Control and prevention of gonorrhea
- Using the ABC formula for preventing AIDS and other STDs.
- A-Abstain from sexual intercourse
- B- Be faithful to your partner
- Condoms should be used during sexual intercourse
- Seek early medical treatment
- Stop playing sex until you are completely treated.

Syphilis
Syphilis is a chronic and dangerous venereal disease caused by a bacterium called Spirochere
It is spread by having sexual contact with the infected person.

Signs and symptoms vary with stages
- Painful sores called chancre appears 2-5 weeks after infection.
- In second stage a number of signs and symptoms such as sores in mouth, throat, itching skin, rashes appear.
- In the third stage the bacteria cause heart disease, paralysis, blindness and insanity or madness.

Prevention and control of syphilis
It is prevented by practicing ABC approach
Infected people should see a doctor immediately

Other urinary tract infection
- Pelvic inflammatory diseases (PID)
- Infected people should see a doctor immediately

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- It affects the abdominal and pelvic area.

Epididymis
Serious infection of the epididymis leading to swelling tenderness and pain in the testicles.

Geniral nerpes
These are sores (inflammation) of the genirals caused by virus called nerpes simplex.

Trichomoniasis Vaginalis
It is caused by protozoa called trichomonas
The disease causes inflammation of the vagina

Geniral warts
These are sores in the sexual parts and around the anus.
They are caused by a virus.

Hydrocele
It is an increase in quantity of fluids in the sac around the testis and epididymis.

Orchitis
Inflammation of the testis due to injury or infection of tuberculosis

Candidacies
It is also called thrash and is caused by a fungus

Sterility
In ability of a man to impregnant a women or a woman failing to conceive

Lymph glandcoma
This refers to enlarge lymph nodes spread by sexual contact.

Urethriris
A disease that cause the urethra to become sore and swollen.

Prevention
- Using ABC approach
- Seeking medical attention
- Personal hygiene especially of the genitals.

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FORMS OF ENERGY

What is energy?

Energy is the ability of the body to do work.

Energy exists in the following forms (types)

i. Sound energy
ii. Heat energy
iii. Light energy
iv. Mechanical energy
v. Nuclear (Atomic energy)
vi. Solar energy
vii. Chemical energy
viii. Electrical energy

N.B
Kinetic and physical energy are forms of mechanical energy.

SOUND

Sound is a form of energy that stimulates the sense of hearing (that enables us to hear)

TYPES

i. Loud sound
ii. Soft sound
iii. High sound
iv. Low sound.

Sources of sound

Natural sources

- Animals
- Wind
- Storm
- Volcanic eruption

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Artificial services
Musical instruments

How is sound produced?
Sound is produced by vibration (when an object vibrates)

What is a vibration?
A vibration is a to and fro motion which is continuously repeated.

Ways how living things produce sound
- Human beings produce sound by the vibration of their vocal cords. Vocal cords are found in the voice box. When air passes over them, they vibrate and produce sound.
- Crickets produce sound by rubbing their wings against the hind legs.
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Transmission of sound
How does sound travel?
Sound travels in sound waves. It travels through the following media:
- Air
- Water
- Solid materials

N.B sound does not travel through vaccum.
- The speed of sound in air is 330m/sec
- The speed of sound in water is 500m/s.
- The speed of sound in metals (solids) is 4800m/sec

Therefore
i. Sound travels fast in gasses
ii. Sound travels faster in liquids.
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Factors affecting the speed of sound
- Temperatures
- Wind
- Altitude
- Heat

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Frequency
This is the number of vibrations per second.

Pitch
This is the highness or lowerness of sound.

An experiment on pitch.

What determines the pitch of sound?

- Size of a vibrating object.
- Length of a vibrating object.
- Thickness of the string producing sound.
- Tension
- Frequency

Volume
It is the loudness or softness of sound.

Echo
Is the reflected sound (the bouncing back of sound waves)
Echo is formed when sound is reflected by an object.

Uses of echo in nature.

- It helps bats to find their way and locate food.
- It helps sailors to detect the depth of the sea or ocean.
- Fisherman use echo to locate shoals of fish before letting down their nets.
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Ways of preventing echoes.
Cinema halls. Theatres and confidence halls are covered with boards and thick carpets to reduce echo by absorbing sound.

MUSICAL INSTRUMENTS
They are classified into three:
String instruments
Wind instruments
Percussion instruments

String instruments

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These produce sound by vibration of their strings who plucked.
Examples

i. Guitor
ii. Tube fiddle
iii. Harp
iv. Lyre etc

Diagrams

Wind instruments
These produce sound by vibration of air blown inside them.
Examples

- Records
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Percussion instruments
These produce sound by vibration of movable parts on the or column of air inside them.

Examples

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- Thumb piano
- Shakers
- Xylophone
- Rattles etc

Diagrams

Methods of storing and reproducing sound energy
Devices used in storing sound.
Solfa and staff notation

An illustration

Magnetic cassette tepes

- Compact discs (C.D)
- 1 pods
- Flash discs

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- Dat
- Memory cards
- Cellular phones
- Computers

Devices used to reproduce sound

- Using record players
- Swipping solfa and staff notation using human voice.
- Use radio cassettes
- Using tap recorders
- Using video decks
- Using film projectors.

THE MAMMALIAN EAR

The structure of the mammalian ear.

The ear is divided into three:

i. Outer ear
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iii. Inner ear

The middle ear

It consists of:

i. Ear drum
ii. Ossicles
iii. Eustachian tube.

The inner ear

It consists of:-

- Semi circular canal
- The cochels
- Auditory nerves

It is fluid filled.

Common diseases of the ear

i. Otitis externus
ii. Otitis internus

N.B Disorder may be foreign bodies and any harm caused by an accident.

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CARE FOR THE EAR.

i. Avoid using sharp objects to clean the ear. Sharp objects break and damage the eardrum.
ii. Use soft materials to clean the ear.
iii. Have regular health examination
iv. Remove excess wax from the external ear that can cause temporary deafness by blocking the eardrum.
v. Clean your ear with clear water and soap regularly.

CLASSIFICATION OF FLOWERING AND NON FLOWERING PLANTS

PLANT KINGDOM

Plants are divided into two groups viz:

i. Non flowering plants
ii. Flowering plants

NON – FLOWERING PLANTS

These are plants which don't bear flowers. Groups of non flowering plants

- Spore bearing plants
- Coniferous plants

Spore bearing plants

These are plants that reproduce by means of spores.
They include:

- Ferns
- Mosses
- Livestock
- Horsetails

A spore is a single cell 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 the lower side of the leaved in spore cases.
- They grow in shady moist places.

Diagram

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

Diagram

LIVERWARK
- Grow in wet moist places.
- Have chlorophyll and make their own food.
- Reproduce by means of spores.

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 breakers.
- Produce soft wood for making papers, match sticks, ceiling boards.
- Earns foreign exchange.

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

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Groups of flowering plants

- Monocotyledonous plants
- Dicotyledonous plants.

Monocotyledonous plants

These are plants that bear seeds with one cotyledon.

Examples

Millet	maize
Sorghum	rice
Barly	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 bar seeds wit the cotyledons.
Examples:
Legumes e.g. beans, peas, groundnuts, bananas etc.

Characteristics of dicotyledonous plants

- Produce seeds with two cotyledons
- Undergo hypogeal 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 bird – Growing tip of the plant.

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Auxiliary bud – grows into branch, flower etc.
Node – Point a stem whose leaf grows.
Internode:- The region between two nodes
Root cap:- Protects the tip of hair root.

ROOTS

Apart of a plant that grows into 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;- maze, 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

An experiment to illustrate osmosis.

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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.
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- Some are used for propagation.
- Some provide timber.

Types of stems

- Upright stems.
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- Underground stems.

With diagrams

Reasons why pants climb others.

- To get support
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Ways how plants climb others

- Use of tendrils
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This is the way plants can be grown using stems.

Examples

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- Rhizomes
- Corns
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- Suckers

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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
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Adaptations of leaves for photosynthesis

- Have a broad flat shape to increase surface area for light.
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- Have stomata for gaseous exchange.
- Have veins for translocation.

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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.

Factors affecting transpiration
- Temperature
- Light intensity
- Wind
- Nature of the leaf
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- Plants shed off their leaves
- Forming a layer of wax on the leaf surface.
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There are two types of reproduction in plants.
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The structure of a flower (Its parts and functions)

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The transfer of pollen grains from anthers to the stigma.

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With diagrams

An experiment to illustrate osmosis.

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Functions of the stem to plants.

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- Help in transpiration
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Sexual reproduction.

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The structure of a flower (Its parts and functions)

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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.

Diagram

Agents of pollination

- Animals
- Wind
- Water

Characteristics of insect and wind pollinated flowers

Wind	Insects
Have no nector	Have nector
Brightly coloured petals	Dull petals
A lot of pollen grains	Few pollen grains
Have no scent	Have scent

FERTILISATION

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

Diagram

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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	Undergoes epigeal

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germination	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
- Sry 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
- Ovacadoes
- Coconuts

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- 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.

THE CIRCULATORY SYSTEM

Parts of the circulatory system;
Blood
The heart
Blood vessels.

BLOOD

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This is a red fluid that flows in and round the body.
Composition of blood

- Red blood cells (eryothrocytes)
- White blood cells (leucocytes)
- Plasma
- Platelets (thrombocytes)

In a normal health person, there are about 5 to 6 litres of blood.

Red blood cells

There are about 30 million red blood cells n the human body. They contain a red pigment called haemoglobin that contains iron. They are made in red bone marrow of short bones like sternum, scapula, ribs, vertebra and pelvis.
They don't nave a nucleus.
Their function is to transport oxygen in the body.

The structure of a red blood cell.

Functions of blood

- It carries digested food and oxygen to all body parts.
- It carries waste products from the body parts to excretory organs.
- It transports carbondioxide from the body tissues to the lungs.
- It distributes heat to the body.
- It carries hormones.
- It defends the body against disease infections.

Blood groups

There are four blood groups.
A
AB
B
O

NB. AB is a universal recipient while O is a universal donor.

Blood transfusion is the transfer of tested and screened blood from one person to another. The scientist who discovered blood groups was Sir Karl Landsteiner.

White Blood cells

- These are larger than red blood cells.

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- They have a nucleus but no haemoglobin.
- They are made in red bone marrow. Lymph nodes and the spleen.
- Their main function is to fight against disease germs.

Qn. How do white blood cells defend the body?
- By engulfing and digesting germs
- By producing anti bodies against the germs.

An illustration of a white blood cell.

Platelets
Are made in the red bone marrow. Their function is to help in clotting of blood.

Plasma
This is the liquid part of blood consisting of the following;
- Water
- Blood protein
- Dissolved food
- Mineral salts
- Urea
- Carbondioxide
- Hormones
- Insulin (prevents diabetes) etc

BLOOD VESSELS
There are three blood vessels
- Arteries
- Veins
- Capillaries

ARTERIES
- They transport blood away from the heart to the body.
- They have thick walls.
- They have a small lumen.
- Blood in them flows the walls of the artery.

Diagram showing the walls of the artery.

VEINS

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They carry blood towards the heart.
They have thin walls.
They have a wider lumen.
They have values to prevent the back flow of blood.

The structure of a vein.

CAPILLARIES
These are the smallest blood vessels.
They connect arteries and veins.
Exchange of body materials take place in blood capillaries.

The structure of a capillary.

THE HEART
The structure of the heart, part and functions.

The heart is divided into four chambers:
The upper chambers are called a tria (a trium) and the lower chambers are called ventricles. The main function of the heart is to pump blood.

Organs related to the circulation of blood.
- The heart
- The lungs
- The kidneys
- Small intestines
- The liver

The diagram to show circulation of blood.

ALCOHOL IN SOCIETY
Alcohol is a colourless liquid substance that makes people drunk when they drink too much of it. It is contained in many drinks like beers, wines and spirits.

Types of alcohol
There are two types of alcohol namely

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- Methanol
- Ethanol

Methanol is found mostly in home distilled alcohol.

- It is very dangerous and poisonous and many cause blindness or death.
- It is mainly used as a fuel or for sterilizing medical instruments.
- Ethanol is contained in all alcoholic drinks that are consumed.
- It can also be used as fuel.

Production of alcohol

Common alcoholic drinks are made from juices of bananas, pineapples, sugar cane, maize, millet, sorghum, rice, barley, cassava, potatoes.

Yeast is added to the mixture of water and these food substances to speed up fermentation.

Methods of producing alcohol

i. Fermentation
ii. Distillation

Fermentation is the process by which sugar in juice is turned into alcohol with the help of yeast.

- Fermented fruit juices make wine.
- Fermented starch mixture from grains or cereals from beer.

Examples of drinks produced locally by fermentation

- Mwenge bigere - from bananas
- Malwa (ajon) - from millet/ sorghum
- Kwete - from cassava / maize
- Munanansi - from pineapples
- Omurambi - from sorghum
- Beer - from oats and barley.

Distillation

- This is the process by which we get alcohol from fermentation.
- The alcohol in the fermented juice is heated and it evaporates.
- The alcohol vapour is then condensed and collected.

How distillation of alcohol is done.

- Crude alcohol is boiled to produce alcohol vapour.
- The vapour is cooled (condensed) to get liquid alcohol with the help of cold water of a condenser.
- The liquid alcohol now called distillate is passed through a coiled delivery tube in to a clean container i.e. bottles or jerry cans.
- The delivery tube is usually coiled to increase the surface area for condensation of alcohol in the condenser. (cold water)

Illustration on how distillation is done;

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Uses of alcohol

- For drinking
- Making medicines
- For disinfecting wounds
- For sale to get money
- Used during cultural functions
- Used in making cosmetics and perfumes

Alcoholism is a condition where an individual depends on alcohol for normal functioning of the body.

Alcoholic is a person who depends on alcohol for normal functioning of the body or a person who is addicted to alcohol.

Addiction is a condition in which a person has a very strong desire to take alcohol every day.

Effects of alcohol on the community

- May lead to job neglect causing low productivity.
- May cause traffic accidents at home, suicidal behavior.
- High crime rate in the society e.g rape, defilement, robbery etc.
- Can lead to increase of certain diseases in the community e.g AIDS.
- Alcoholics become public nuisance.
- Nation may lose very important people
- Loss of income tax base due to less production.

Reasons why people drink alcohol

- Idleness
- Frustration
- Peer pressure
- The desire to pass time, with friends.
- Family back ground and social environment
- To show that they are rich.
- People's culture in ceremonies/ celebrations
- Misleading adverts on T.V, radio, magazines
- To forget their problems.
- Influence by people one admires e.g. parents, teachers etc.
- Used in making nail varnish solutions
- Used as fuel
- Used to sterilize instruments in hospitals.

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Effects of alcohol on people (immediate effects)

- Slows down the action (function) of the brain.
- People who are not used to drinking a lot of alcohol vomit when they drink a lot of it.
- People get easily annoyed after drinking a lot of alcohol.
- People who are drunk become forgetful
- People who are drunk lose respect for laws.
- People who are drunk lose balance.

Long term effects

- Loss of appetite
- Peptic ulcers
- Liver diseases
- Leads to self neglect
- Loss of jobs
- The pancreas may swell.
- Too much and constant drinking may cause hand tremors

Effects of alcohol to a family

- Leads to family neglect
- Leads to poverty in a family.
- It causes spouse and child abuse.
- Leads to bad behavior among children
- It causes violence in homes.

How to avoid alcoholism

- Avoid bad peer groups
- Never believe in advertisements which praise alcohol as a good drink.
- Never drink alcohol to over come a problem.
- Join groups whose members do not take alcohol.
- Engage in activities which help you to append free time properly.
- Take your parents and other people's warning about the dangers of alcohol seriously.

Uganda laws on alcohol

- People under 18 years of age are not allowed to drink alcohol in public places.
- No one is allowed to drive a vehicle when he is drunk.
- Home distillation of alcohol is forbidden
- No one is allowed to transport or sell home distilled alcohol.
- Public places that use alcoholic drinks are allowed to operate up to a limited time.

SMOKING

Smoking is the drawing in smoke from burning tobacco through the mouth.

A smoker is a person who smokes tobacco frequently.

Chemicals contained in tobacco

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- Nicotine
- Tar

Smoking is either active or passive

Active smoking is that one in which the smoker takes in smoke directly from cigarette or smoking pipe.

Passive smoking is the type of smoking in which a non smoker breathes in air containing tobacco smoke.

Reasons why people smoke.

- To pass time
- To concentrate on what they are doing
- To feel warm
- To fit in a group (peer influence)
- To feel confident
- To look mature
- To look attractive

Effects of smoking on the human body

- Leads to respiratory diseases such as;
- Lung cancer
- Emphysema
- Bronchitis
- Heart attack (coronary heart disease)
- Peptic ulcers
- Cancer of the mouth and throat.

How to avoid smoking

- Do not believe in advertisements about cigarette smoking.
- Know that there is no good reason for smoking
- Avoid joining groups smokers.
- Keep yourself busy for example by reading a novel, or doing any other meaningful activities such as playing games etc.

Life skills to safeguard against smoking.

- Keep away from people who smoke
- Never allow any body to convince you to smoke.
- Gather more information on dangers of smoking from health workers.
- Report your friends who smoke to the teachers or their parents for advise.
- Like games and sports during your free time.
- Never use your money to buy cigarettes.

DRUG ABUSE AND DRUG MIS –USE

A drug is a chemical substance which affects the way one's mind and how the body

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works.

- It can either help or harm the body system.
- Drugs are either in manufactured from of raw materials
- Raw drugs are either in the form of plants and animal parts or extracts from animal or plants.
- If drugs are manufactured and tested in laboratories they are called laboratory manufactured drugs.

Characteristics of laboratory manufactured drugs

- They are carefully made and tested.
- Their strength, stability and purity is known.
- They are the same for each quantity.
- Their effect on human health is known,
- They are packaged and properly protected
- They are well labeled
- They have expiry and manufactured dates.

Examples of laboratory manufactured drugs

- Aspirin
- Chloroquine
- Quinine
- Fansidar
- Panadol
- Coartem
- Mabendazole

Characteristics of traditional drugs.

- They are made of raw plants and animals
- Their strength, purity and stability changes.
- They are of different quantities
- Their effects on human health is not known.
- They are not well labeled
- They are not well packaged.

Examples of traditional drugs

- Mululunza
- Kigagi
- Bombo
- Eusuk
- Asimiri

Essential drugs

Essential drugs are drugs needed to care and prevent common diseases affecting

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the majority of people in an area or country.

Qualities of essential drugs

- They should be affordable to make the cost of treatment manageable.
- They should be accessible and available whenever needed.
- They should be effective to cure, prevent and control diseases.
- They should be safe when the correct dosage is used.
- They should have a satisfactory value for money.

Examples of essential drugs

- Cough mixture
- Chloroquine
- Paracetamol
- Piriton
- Penicilion
- ORS
- Tetracyline

Drug prescription

This refers to health workers written information on how a drug should be used.

If a drug is taken without a prescription, the patient will either take under or over dose.

Over dose

This is the taking in of more medicine than is required.

An overdose is dangerous to the body because it can lead to poisoning or death.

Under dose

This is when one takes fewer drugs than the required

The major disadvantage of an under dose is that it causes drug resistance.

Advantages of drug prescriptions.

- It helps the patient to know the correct drug.
- Its dosage relation to age, weight and duration of treatment
- Prevent over doe which is harmful and poisonous to the body
- Prevents and controls misuse of drugs

Drugs of dependence

These are drugs which cause addiction after prolonged use.

An addition to a drug is a strong disease that one feels uncomfortable when he / she does not use the drug.

Drugs of dependency

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This is the continuous use of drugs on a regular basis after the body of the user. It can also be the illegal use of the drug.

Common drugs of dependency

- Marijuana
- Khart or miraa
- Cocaine
- Glue
- Aviation fuel
- Heroin
- Alcohol
- Tobacco
- Paint thinner.

Why people abuse drugs

- Some people abuse drugs to over come fear
- Due to peer influence
- To keep a wake or sleep
- Due to good advertisement
- To pass time
- To feel warm
- To get energy
- To concentrate on what they are doing
- To gain more appetite.

Effects of drugs of dependence to an individual

- Brain damage
- Loss of appetite
- Insomnia (inability to sleep)
- Job neglect
- Self neglect
    - Low immunity to disease

Effects to the family

- Family neglect
- Family aggression and violence
- Criminal acts like defilement and rape
- Poverty
- It sets a bad example to the children

Effects to the community

- It leads to increased accidents

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- Criminal behavior
- Poor job performance

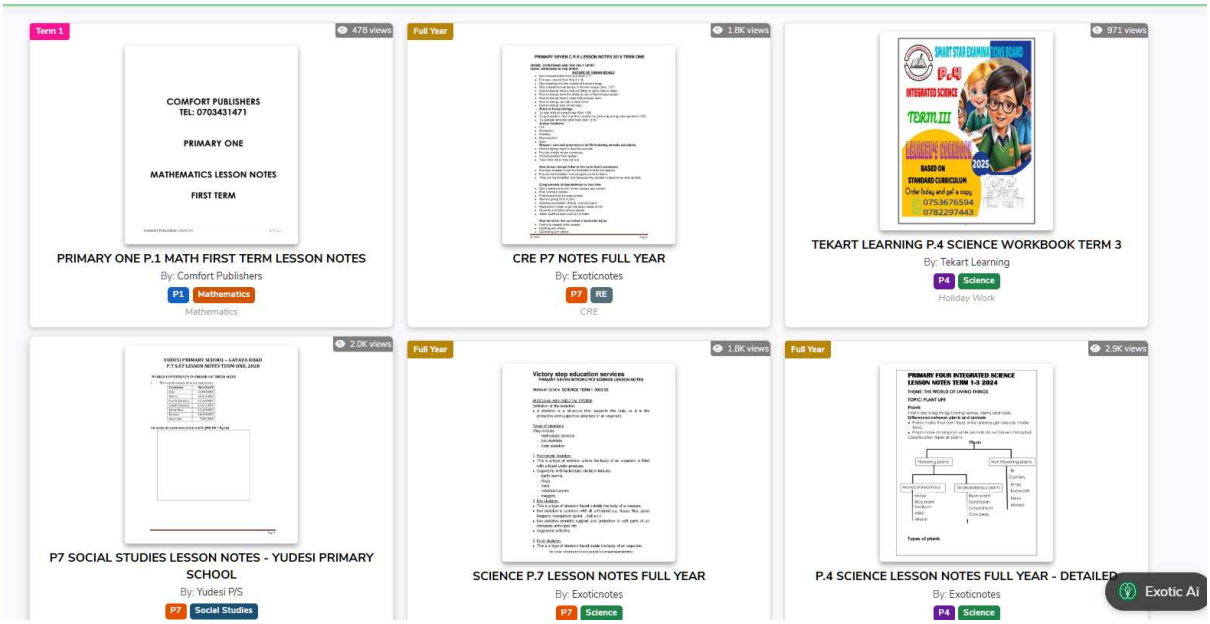
Life skills that can help you to avoid drugs

- Desist from bad peer groups
- Through counseling and guidance
- Follow good morals from elders.
- Spending leisure time constructively by engaging in productive activities.
- Reading good material which is useful to life.

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