SHALOM PRIMARY SCHOOL

PRIMARY FIVE SCIENCE LESSON NOTES 2020

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TERM I TOPICS

1. Keeping poultry and bees
2. Measurement
3. Immunization
4. The digestive system

Lesson 1 Week 1

POULTRY KEEPING

Key terms used in poultry

Poultry is the rearing of domestic birds (fowls).

Poultry are domestic birds.

Examples of poultry

i. Chicken
ii. Ducks
iii. Pigeons
iv. Turkeys
v. Guinea fowl

REASONS WHY FARMERS KEEP POULTRY

i. For egg production
ii. For meat (Chicken) production
iii. For sell to get money (family income)

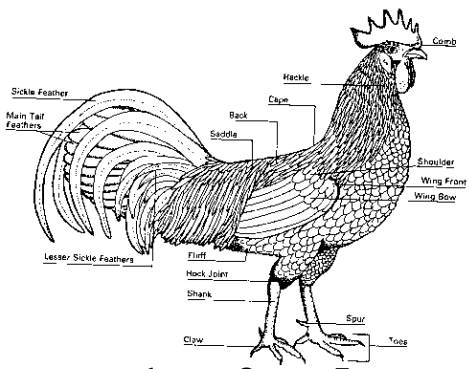
Other uses of poultry

To get feathers for different purposes e.g. making pillows, decoration, dancing propes, cushions.

Some birds are kept as pets in homes e.g. peacocks, hens, parrots.

Source of farm yard manure from the droppings.

EXTERNAL PARTS OF A COCK



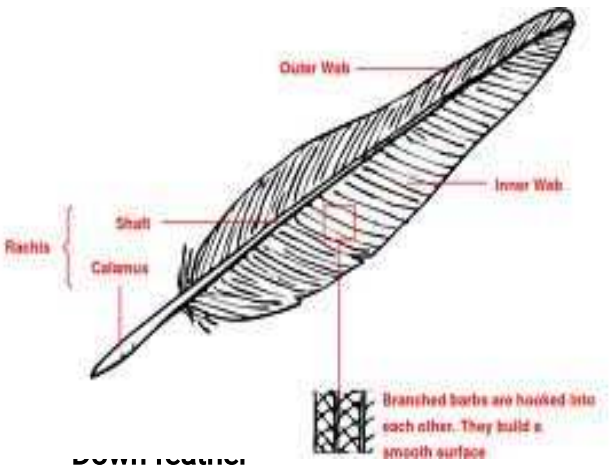
1. **Spur -** For protection / defence
2. **Beak / bill**
   i. For picking food
   ii. For defence
   iii. For building their nests
   iv. To clean itself and arrange its feather.(preen)

3. **Toe nails (claws)**
    i. To scratch for food
    ii. For defence
4. **Comb and wattle**
    i. For identification
5. **Feathers**
    i. For identification
    ii. For courtship (attracting of opposite sex for mating) incase of a cock.
    iii. To protect the delicate skin
    iv. To keep the birds warm
    v. For incubation of eggs.
    vi. For brooding their young ones.

NB: Cocks have bright feathers for courtship(Attracting of opposite sex for mating)

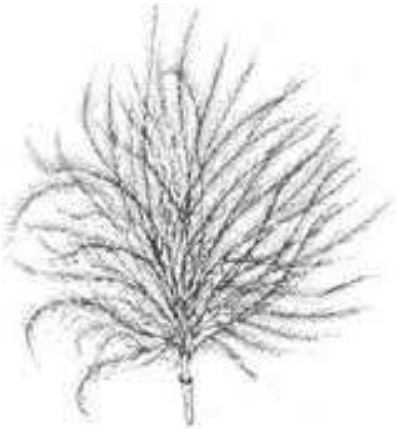
STRUCTURES OF FEATHERS

Quill feather



Covert feather

Down feathers



Filoplume



Purpose of the above feathers:

Quill feathers-They are used for flight

The body feathers-To keep the bird warm

Down feathers-They help in insulating the bird

Filoplume feathers-They keep the bird warm

LESSON 3

DIFFERENCES BETWEEN A HEN AND A COCK

A cock	A Hen
i. Has a large spur	Has a small spur
ii. Has a large comb	Has a small comb
iii. Has a large wattle	Has a small wattle
iv. Does not lay eggs	Lays eggs
v. Has large ear lobes	Has small ear lobes
vi. Has long strong claws	Has small claws
vii. Has a large beak	Has a small beak

NB: Observe the real bird (cock and hen)

BREEDS OF CHICKEN

What is a breed?

A breed is a group of animal with specific characteristics / behaviours.

Groups of breeds of chicken kept in Uganda

1. Local breeds (Indigenous)
2. Exotic breeds (Imported / foreign)

NB: Exotic breeds can either be grouped as heavy breeds or light breeds.

Heavy breeds	Light breeds
i. Rhode Island red	i. Ancona
ii. New Hampshire	ii. Minorca
iii. Orpington	iii. Light Sussex
	iv. White Leghorn
	v. Skyers

LOCAL BREEDS

Advantages of local breeds of chicken (indigenous)

- Local breeds are easy to manage.
- Local breeds are resistant to tropical diseases.
- Local breeds look for their own food.
- Local breeds incubate their own eggs.
- They brood their own chicks.
- They get a lot of physical exercises as they move from one place to another looking for food.

Disadvantages of keeping local breeds of chicken

- They grow very slowly
- They lay fewer eggs.

How to improve upon the local breeds of chicken

- Through cross-breeding of local breeds with exotic breeds to get a hybrid.
- Through selective breeding (choosing breeds of good quality).
- Throughout breeding – mating of different families of the same breed.

LESSON 4

Advantages of cross-breeding

- Encourages fast growth in birds
- Results into more eggs being laid by the offspring.
- Improves on the productivity of poultry.

Advantages of keeping Exotic breeds of chicken

- Exotic breeds grow very fast.
- Exotic breeds lay many eggs.

Disadvantages of exotic breeds of chicken

- Exotic breeds are not resistant to diseases.
- They do not incubate their eggs.
- They cannot look for their own food.
- Exotic breeds are expensive and difficult to look after.
- They cannot brood their own chicks.

Compare the local poultry with exotic breeds.

Types of chicken

There are three main types of chicken kept in Uganda.

Layers: Kept for egg production

Boilers: Kept for meat production

Dual Purpose: Kept for both meat and eggs production.

FEEDING OF POULTRY

Chicks feed on **chick mash**

Boilers feed on **Boilers' mash**

Layers feed on **layers' mash**

Growers feed on **Growers' mash**

Composition of chicken mash (feeds)

- Silver fish (enkejje)
- Bone meal
- Common salts
- Maize meal
- Sea shells (rich in calcium for the strong growth of bones)

Different types of birds are fed on such feeds for a purpose

i. **Layers:** Layers' mash makes them to lay many eggs with hard eggshell as its rich in calcium. The calcium also helps them to strengthen their bones.

ii. **Boilers':** Broilers' mash has a lot of proteins which makes the broilers to grow

very fast and put on more weight in short time.

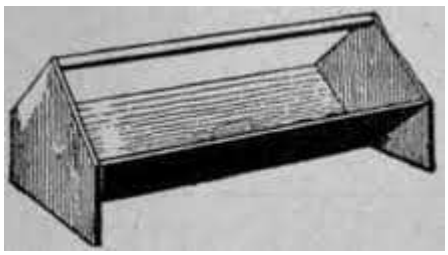
iii. **Growers':** Growers' mash is very rich in protein which makes the growers to grow very fast and well.

iv. **Chicks' mash** is soft and easy to digest by the chicks' gut. It is rich in proteins which makes the chicks to grow very fast.

Summary table

Types of chicken		Food	Age
i.	Chicks	Chick mash	0 – 4 weeks
ii.	Growers	Growers' mash	4 – 16 weeks
iii.	Broilers	Broilers' mash	4 – 8 weeks
iv.	Layers	Layers' mash	Over 16 weeks

FEEDING AND DRINKING EQUIPMENT





LESSON 5

DIGESTION IN BIRDS

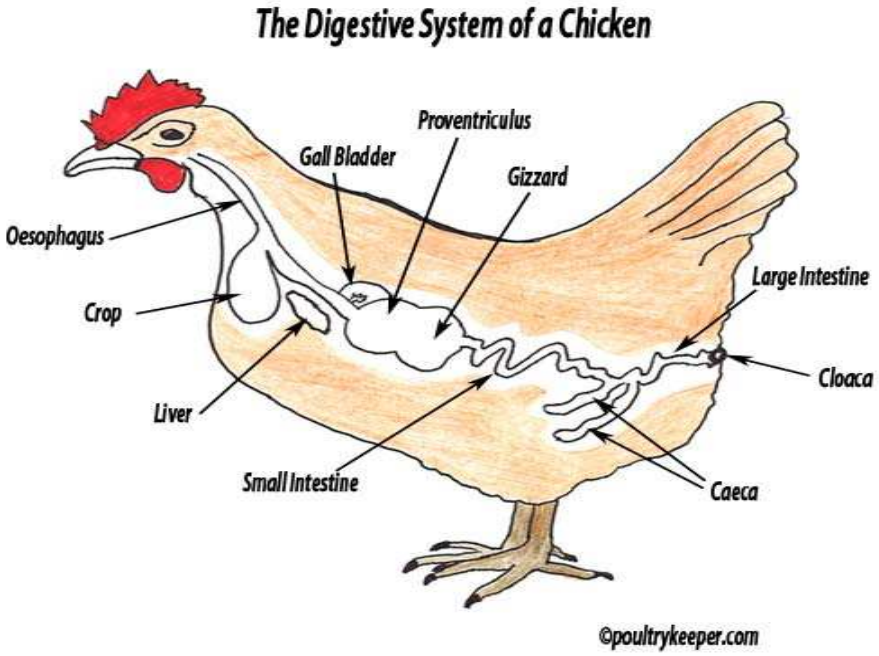
Digestion is the breaking down of food into smaller particles.

Birds have no teeth

They have a horny beak

They swallow food wholly (food is swallowed whole)

ALIMENTARY CANAL OF BIRDS



Functions of different parts of the alimentary canal of bird

1. **Beak / bill:** Is used to:

- Pick food
- Break food into smaller piece

2. **Gullet (Esophagus):** Is used to carry food from the break to the crop.
3. **Crop:** Softens / moisten food before it is passed onto the stomach
4. **Stomach:** Secretes digestive enzymes that mix with food.
5. **Gizzard:** Contains small stones (grit) that grind (crush) food into small particles.
6. **small intestine:** Final digestion takes place. Where absorption occurs.
7. **Colon (large intestines):** Absorption of water takes place.
8. **Caeca:** Stores undigested foods remain temporarily. It is where cellulose is acted upon by bacteria.
9. **Vent:** allows wastes (chicken droppings) out of the body of a bird.

LESSON 6
INCUBATION

Incubation: is a process by which fertilized eggs are given favourable conditions in order to hatch into chicks.

Favourable conditions for eggs to hatch

- Good temperature (warmth) 32^0C - 38^0
- Relative humidity (moisture) of 0%
- Good ventilation (free circulation of air).

Reasons some eggs fail to hatch even in the presence of favourable conditions

- If an egg has double yolks
- In case an egg has an abnormal shape
- In case an egg is too small in size.
- When an egg has no air space.
- If an egg has a soft egg shell.

INCUBATION PERIOD

Incubation period is the time taken by the eggs to hatch into chicks.

Incubation period of the following birds

Birds	Incubation period
Hens	21 days
Ducks	28 days
Turkeys	28 days
Geese	30 days
Pegions	14 days

LESSON 7
Parts of an egg

FUNCTIONS OF EACH PART

Egg shell: It protects the inner egg content.

It is made of mineral salt called calcium

Chalaza

It balances the yolk in position to get equal temperature during incubation period.

Yolk

It supplies food and mineral salts to the growing chick.

We obtain proteins from the yolk.

Albumen

It supplies water and other food values to the growing chick.

It allows oxygen from the air space to pass through to the growing chick and carbon dioxide from the growing chick to diffuse to air space.

LESSON 8

TYPES OF INCUBATION

i. Natural incubation
ii. Artificial incubation

An Incubator (Artificial Incubation)

Natural incubation

In natural incubation the broody hen provides all the necessary conditions as it sits on the eggs for 21 days.

A broody hen can incubate between 15 – 20 eggs at once.

Advantages of natural incubation

- Little or no attention is paid to an incubating hen.
- Chicks get care from the mother hen.
- It is cheap and easy to manage by the poultry farmer.
- There is no bother with brooding the chicks.

Disadvantages of natural incubation

- Few chicks can be hatched at once.
- The hen may get diseases and parasites at an early stage.
- The hen may not be good at incubation.
- Natural brooding is not very effective for commercial production.

Artificial incubation

Artificial incubation is the type of incubation where the eggs are put inside an incubator to hatch into chicks.

NB: In an incubator the conditions for hatching like temperature, humidity are maintained at good level at all times.

Advantages of artificial incubation

- Man eggs can be hatched at once.
- It can be used for commercial purposes.
- It does not require the presence of broody hen.
- Diseases can be easily controlled.

LESSON 9 AND 10

Disadvantages of artificial incubation

- Artificial incubation is expensive
- It requires constant supervision
- It needs expert or skilled attention and care.

Week 2

BROODING

Brooding is giving special care and attention to chicks below 8 weeks.

Types of brooding

There are mainly two types of brooding namely;

i. Natural brooding
ii. Artificial brooding

Natural brooding: Is where the brooding hen cares for her chicks.

- It provides the chicks with security, warmth and food.

Advantages of natural brooding

- The broody hen provides the chicks with food other than the farmer.
- It saves the farmer from expenses of buying an artificial brooder.
- Natural brooding is cheap to the farmer.

Disadvantages of natural brooding

- Chicks can easily die if poorly protected.
- Chicks can easily be killed by wild animals like kites, eagles, wild cats, monitor lizards etc.

Artificial brooding: Is where the chicks are kept in a brooder.

BROODER

A brooder is a special structure where farmers keep their chicks below 8 weeks.

Types of brooders

There are various types of brooders namely:-

1.Infra-red lamp brooder: Is where the infra-red lamp provides heat and light energy.

Feeding and drinking troughs are kept inside the brooder.

Litter is put on the floor to make chicks warm and more comfortable.

Diagram of an infra-red brooder



Advantages of an infra-red lamp brooder

- Chicks are safe
- Warmth in fully provided
- Chicks are protected from parasites and diseases.
- Chicks are given enough food and water.
- The litter poured on the on the floor makes the chicks feel comfortable.

Disadvantages of the infra-red lamp

i. It is expensive to buy
ii. There can be food poisoning
iii. This system cannot be used in places where there is no electricity.
iv. It is difficult to control disease outbreak.
v. In case of power failure, chicks may die of coldness.

2 Kerosene (kerosene brooder)

In this system a kerosene lamp is used to provide warmth and light. This lamp is put on a raised ground and on the floor or lamp above the chicks.

Charcoal brooder

In this system a charcoal stove is used to provide (warmth / heat) and light.

Advantages of a charcoal brooder

- It is cheap since charcoal is easily got.
- It can even be used in rural areas without electricity.

Disadvantages of a charcoal brooder

- It provides a lot of smoke
- The litter poured on the floor can easily catch fire.

Other examples of artificial brooder are:-

- Hot water pipe brooder
- Gas brooder

Disadvantages of the above brooder

- They are expensive to use
- They require a lot of skills and knowledge.

LESSON 11

SYSTEMS OF KEEPING POULTRY

There are four systems of keeping poultry

- Free range system (open system)
- Deep litter system
- The cage (battery) system
- The art / fold / pen system

1. Free range system

Free range system is where birds are allowed to move (roam) about to look for food but shelter is provided to them.

Advantages of free range system

- Birds eat a variety of foods
- Birds look for their own food
- Free range system is cheap to maintain
- It reduces labour to the farmer.

Disadvantages of free range system

- Birds can easily get lost
- The eggs can easily get lost and are difficult to collect.
- The birds can easily be eaten by wild animals like kites, eagles cats etc.
- Eggs become dirty easily
- It is difficult to control diseases and pests parasites.

2. Fold / Ark / Open system

Is where a limited number of birds are kept in a small moveable house called a fold / pen / ark.

- Birds lay their eggs in the pens / folds/ arks.
- These folds are moved from one place to another every day (daily)
- The fold is made of wood, wire mesh and sticks tied together.

  STRUCTURE OF A PEN



Advantages of the pen system

- It is cheap to maintain compared to cage system or deep litter system.
- Manure is evenly distributed on the farm.
- Birds are restricted in movement
- Birds can easily get vitamins and sunlight.

Disadvantages of the pen system

- It is more expensive than free range system
- The folds easily get old and break due to constant movements from one place to another.
- Birds are easily bored since their movement is restricted to their fold / pen.
- More land is needed to shift the folds.
- Much labour is needed to move the folds daily.

LESSON 12

3. Deep litter system

Is a system where the birds are kept in a house throughout.

- The feeds and water are given to the birds inside the house.
- Litter is put on the floor to keep the birds warm among others.
- The house is well lit to allow the birds to feed constantly.

Advantages of the deep litter system

- The litter poured on the floor can be used as manure.
- Birds are protected from thieves and wild animals e.g. wild cats.
- Many birds can be kept in a small house.
- Clean eggs are collected.
- This system can be used for all stages of birds.
- Birds cannot get lost as their movement is controlled.

Disadvantages of deep litter system

- It encourages vices e.g. egg eating, cannibalism, toe pecking etc.
- Litter can be a fire hazard (can easily catch fire).
- It is more expensive than free range system.
- The litter can harbor (keep) pests and parasites.

Components of litter (what litter is made of)

Coffee husks, wood shavings, rice husks, crushed maize cubs and saw dust.

Importance of litter

- Provide warmth for the birds
- Prevent the eggs from breaking as they are laid.
- Litter provides heat that kills parasites / germs.
- Litter got from the house can be used as manure by crop farmers.

LESSON 13

Disadvantages of litter

i. Litter harbors parasites
ii. Litter is a fire hazard.

Battery (cage) system

In this system, birds are kept in separate cages.

- It is not commonly used in Uganda.
- Each cage has one or two birds put outside the cages.
- This enables people to feed the birds easily and reduce contamination of feeds by

the birds themselves.

- Cages can also be constructed in rows / one above the other.
- The cage should have good ventilation.

A DIAGRAM SHOWING A CAGE



Advantages of battery system

i. Diseases and diseased birds are easy to identify
ii. It is easy to identify a bird that does not lay eggs.
iii. Birds are very easy to control.
iv. They are protected from thieves and wild animals.
v. Farmers can get manure easily.
vi. There are less poultry vices than in the deep litter system.

LESSON 14

Disadvantages of battery system

i. A lot of money is needed to start (so it is very expensive)
ii. Birds do not eat whenever they need to.
iii. Birds need much attention.

Poultry diseases

i. Coccidiosis
ii. New Castle disease
iii. Fowl typhoid
iv. Fowl pox
v. Gumbro diseases
vi. Avian leucosis
vii. Salmonellosis
viii. Worms

Diseases caused by a virus

i. New castle diseases
ii. Fowl pox
iii. Gumbro disease

Poultry diseases

1. Coccidiosis

   Is caused by protozoa.

Signs of Coccidiosis

- Ruffled feathers
- Yellowish – White diarrhoea
- Chicks are thin and not lively.
- Blood stained (faeces) droppings.
- Chicks crowd together
- Dullness and drooping of wings.

Prevention of Coccidiosis

- Put drugs in food and water for the birds
- Should keep all the feeding troughs clean
- Isolate or kill infected birds.
- Keep the brooder and the areas around clean and dry.

2. New castle disease

Caused by a virus

Signs of New castle diseases

- Difficulty in breathing, coughing, sneezing and rattling.
- Lameness
- Several birds suddenly die
- Greenish – yellow dropping
- Birds twist their necks
- Staggering and dropping of wings.

Prevention, treatment and control of New Castel diseases

- Disinfect the poultry house regularly
- Vaccinate the birds after every 6 months
- Incase of out break, the flock should be killed.

NB: There is no treatment for New Castle disease so far.

LESSON 15

3. Fowl pox

Caused by virus

Signs of fowl pox

- Difficulty in breathing
- Egg production and fertility reduces
- Watery sores on the comb, wattle and around the eyes.
- Discharge from the nostril and eyes.
- Molting and shedding feathers.
- Ulcers in the mouth (small wounds)

Prevention and treatment of fowl pox

- Vaccinating the birds.
- Maintaining perfect hygiene
- Killing and burning the infected birds.
- Disinfecting the poultry house regularly.

4. Fowl typhoid

Fowl typhoid is caused by **Bacterial** called **Salmonella.**

These salmonella bacteria can attack the human beings as well, therefore it is dangerous for people to eat raw eggs.

Signs of fowl typhoid

- Raffled feathers and a pole wattle
- Folding their heads close to the body
- Watery greenish – yellow droppings
- The liver, kidneys and spleen may become enlarged.

Control and prevention of fowl typhoid

- Vaccinate the birds at 5 weeks.
- Revaccinate at 4 months
- Kill and burn the infected birds
- No specific treatment for fowl typhoid.

5. Gumbro diseases

Caused by a virus

Signs of Gumbro diseases

NB: Affects the chicken between 3 to 6 weeks.

- Ruffled feathers
- Drooping of the wings
- Diarrhoea and later blood stained droppings.
- Chicks die in a short time.

LESSON 16

Poultry parasites

A parasite is a living organism that depends on its host for food and shelter and harms it (has a harmful effect on it)

Types of parasites

i. Endo – parasites
ii. Ecto – parasites

Examples of ecto – parasites

Lice Depluming mites

Red mites

Fleas

Signs of worms

- White chalky droppings
- Watery diarrhoea
- Fewer eggs are laid

Control of worms

Deworm at 6 weeks and every month

How to control ecto – parasites

- Dusting laying nests
- Ensure good hygiene in the poultry house
- Dusting birds with disinfectants
- Dipping the birds' feet in kerosene to kill the fleas

POULTRY VICES

Poultry vices are bad habits in poultry.

Examples of common poultry vices

- Cannibalism
- Egg eating
- Feather pecking
- Bullying
- Toe and skin pecking

Causes of vices in poultry

- Boredom
- Starvation (little or no food)
- Over crowding of poultry
- Lack of a balanced diet

Signs of poultry vices

- Blood stained beaks / bills
- Bleeding at the vent
- Yellow stains of egg yolk on the beak
- Broken egg shells in the poultry house.
- Fighting amongst poultry

How to control poultry vices

- Debeaking birds that eat eggs.
- Avoiding over crowding the birds
- Give the poultry feeds rich in calcium
- Cull or isolate the birds that are aggressive.
- Hang greens in the poultry house to keep the birds busy.
- Provide proper nestling for the layers.
- Collect laid eggs regularly.
- Remove broken egg shell from the house.
- Provide enough feeds to the birds.

LESSON 17 AND 18

Record keeping on poultry

Types of records kept on poultry farm

1. **Flock records:** Shows the number of birds on a farm i.e. (number sold, dead or killed daily).
2. **Health records:** Shows the treatment given to the birds.
3. **Production records:** Shows the production percentage and the number of eggs collected daily.
4. **Feeding records:** Shows the type of feeds, quantity or amount consumed or wasted.
5. **Sales and expenditure:** Shows the expenditure and income from the feeds, eggs, sales of birds etc.

Importance of keeping records on a farm

- Help to plan for the future of the farm
- To know the profit or losses made on the farm
- For fair tax assessment
- Enable the farmer to get loans
- To know the progress of the farm
- Enables the farmer to review the history of the farm.

Week 2

LESSON 1

BEE KEEPING (API CULTURE)

Bee keeping is sometimes called **Api-culture**

APIARY

An apiary is a farm of bees **OR**

An apiary is a place where bees are kept.

Why bees are referred to as social insects.

Bees live and work together in organized group called colonies.

Examples of social insects

Termites
Red ants
Wasps
Black ants

Solitary insects

Solitary insects are the insects that live and work alone.

Examples of solitary

Mosquitoes
Houseflies
Butterflies
Grass hoppers
Dragon flies
Cockroaches etc.

NB: There are two types of bees :

Solitary bees i.e.bumble bee

Social bees i.e. honey bee

External parts of a bee

LESSON 2

TYPES OF BEES IN A HIVE

- Queen bee
- Drone bee
- Worker bee

THE QUEEN BEE



CHARACTERISTICS OF QUEEN BEE

i. It has along abdomen and long legs.
ii. It is the largest bee in the hive
iii. It has shorter wings as compared to its body.
iv. It has a sting.

NB: **Its life span is 4 – 5 years. It lays between 1500 – 3000 eggs per day.**

Function of the Queen bee in the hive

i. To lay eggs in the hive

Queen bee feeds on

The queen bee is fed on royal jelly by the worker bees

THE DRONE BEE



Characteristics of a drone bee

ii. It is the male bee in the hive
iii. The drone is the second largest bee in the hive
iv. It has a blunt hairy abdomen
v. It is the only bee without a sting in the hive.

NB. It is almost never in the hive because it is killed after mating the queen.

Function of a drone bee

- To mate with the queen bee

Wedding flight / maiden flight

A wedding flight is a flight during which the drone bee mates the queen bee.

Why does the drone bee die after the wedding flight?

Due to loss of its reproductive organ (truct) during mating.

LESSON 3

WORKER BEE



Characteristics of the worker bees

i. They are the smallest and busiest bees in the hive.
ii. They have a sting used for defence
iii. They have a pollen basket on their hind leg for carrying pollen grains.
iv. They are female sterile bees because their reproduction organs are under developed.

Diagram showing the hind leg of a worker bee

Roles of the workers bees

i. Guards the hive.
ii. Collect nectar water and pollen grains.
iii. Build the hive using wax
iv. Clean the hive
v. Collect propolis used to seal the cracks on the hive.
vi. Feed the grubs (larvae) on honey
vii. Feed the queen bee on royal jelly.
viii. Fan the hive to reduce(lower) the temperature
ix. Make honey and store it in the honey combs.

LESSON 4

GENERAL HABITS OF BEES

i. Bees make woggle and round dances to communicate
ii. Bees swarm from one place to another

iii. Bees collect nectar and pollen grain from flower.

TERMS USED IN APICULTURE

Apiculture: Is the keeping and management of bees (refers to bee keeping)

An apiary: Is a farm of bees / a collection of bees hives or a place where bees are kept.

Hiving: Is the act of attracting bees to the hive using baits.

Baits: are things used to attract bees into the hive e.g. fruit juices, ripe bananas, cow dung e.t.c.

A colony: Is a group of bees living together.

Swarming: Is the movement of a swarm of bees from one place to another for a purpose.

Maiden / marital flight

Is a flight during which the drone bee mates with the Queen bee.

A SWARM

A swarm is a group of bees either deserted or moving.

Bees always store enough honey in their stomachs to last them for some days.

After swarming, the bees settle down on a branch to wait for the scouts or messenger bees that are sent to look for a new hive to come back.

Why bees swarm

i. Bees swarm when they are over crowded in the hive
ii. When a new queen bee is born.
iii. Due to a bad smell near the hive or inside the hive.
iv. Due to dampness in the hive (incase the hive leaks)
v. Due to direct sunlight into the hive.
vi. In case the bees are attached by enemies.
vii. Due to shortage of food and water in an area due to drought.
viii. In case the queen bee dies.
ix. If there are two or more queen bees in the hive.

LESSON 5 AND 6

LIFE CYCLE OF A BEE

Bees undergo a complete metamorphosis i.e.

Eggs – Larva (grubs) - Pupae – Adult (Imago)

Diagram

Bee hives

Bees naturally hive in holes in the ground, caves or in hollows in big trees.

When a farmer wants to keep bees, he provides for them a shelter called a bee hive.

Types of bee hives

There are two types of bee hive.

i. Traditional (local bee hive)

ii. Modern been hive.

Local bee hive

Examples of local bee hive

a). Kigezi hive

b). Dug out long bee hive

Advantages of local bee hive

i. They are easy to make
ii. They are made from locally available materials
iii. They are cheap to maintain.

Disadvantages of local bee hive

i. It is easily destroyed
ii. Not easy to inspect
iii. Lasts for time
iv. Honey is not always clean
v. Not easy to harvest honey.

Modern bee hives

Internal structure of a modern beehive

Section in a modern bee hive

Brood chamber: Where queen lays eggs which later hatch into grubs (larvae)

Honey chamber: This where the worker bees keep honey. Only workers can reach this section.

The honey is clean without eggs or larvae.

Queen excluder: Prevents the queen from entering the honey chamber or

Separates the honey chamber from the brood.

Therefore the queen excluder prevents honey from ge3tting contaminated

Advantages of a top bar hive

a. The hive can easily be inspected
b. Harvested honey is always clean
c. Top bar hive is durable (lasts for along time)
d. Only the honey combs which are ready can be harvested.

LESSON 7 AND 8

Disadvantages of a top bar hive

A top bar hive is expensive to make.

STARTING A COLONY

Requirements for starting a colony

- Queen bee
- Baits e.g. sugar solution for the bees to feed on.
- A trough of water to place near the hive.

Stocking a hive

Stocking a hive means putting bees in an empty hive to occupy it.

How is stocking done in apiculture?

By setting up a hive, putting baits and waiting for the bees to occupy it or Trapping bees into the hive using a swarm cather.

Diagram of a swarm catcher

NB: The farmer uses the above swarm catcher to transfer the bees trapped to the main hive.

Location of an apiary (farm of bees)

- Away from people or animals to avoid disturbances
- Away from the main road
- In a sheltered and quiet (under shade)
- Near a water source
- Near flowering plants.

HARVESTING HONEY

- Dress in suitable clothing e.g. overall
- Make sure the smoker works properly.
- Lower the hive to the ground to avoid damaging the combs.
- Avoid killing the bees.
- Leave some old combs for the bees to suck honey.

The best time of the day for harvesting honey

In the evening when it is cool and all the bees are settled or clam.

Equipment for harvesting

i. A bucket (pan) for collecting honey.
ii. A knife: used to cut honey combs
iii. Overall to protect the harvester from stings.
iv. Bees veil: to protect the face from bee stings
v. Gloves: to protect the hands
vi. Gum Boats: to protect the feet.
vii. A smoker: to produce smoke that calms bees.

LESSON 9

THE HONEY HARVESTER

Bee products (summary)

Honey and bee wax are the main products from bees.

Other bee products include

i. Propolis
ii. Royal jelly
iii. Combs
iv. Brood
v. Bee venom

How is honey processed?

- Golden yellow combs are removed and crushed.
- The crushed combs are sieved / filtered.
- The wax remains on the sieve as honey drops into a clean container under the sieve.
- Collected honey is then melted over a steam bath.
- After settling, the scum that forms on top of the honey is removed using a spoon or knife.
- At this stage, honey is ready for eating.
- However, it can be sieved a gain to make it purer and give it clean clear colour.

How to obtain bee wax

i. Honey combs are placed in a sauce pan filled with warm water.
ii. The water may be heated but not at boiling point.
iii. The bee wax melts into the warm water.
iv. After cooling, wax forms on top of the water.

Which food value do you mostly got from eating honey?

We mostly get carbohydrates.

Importance of honey to man

i. Honey is eaten directly as food
ii. Honey is used to sweeten tea.
iii. Liquid honey is eaten with bread and cakes.
iv. Honey is used to make alcoholic drinks.
v. Honey is used to treat cough.
vi. Honey can be sold to get money.

Industrial uses of honey

i. Honey is used to make medicine e.g. cough syrups.
ii. It is also used to make sweets, chocolate.
iii. It is used in fruit canning as a preservative.
iv. Honey is used to make cosmetics e.g lip shiner.
v. Honey is also used in hospitals to dress wounds in surgical cases.

Importance of bee wax to man

i. For making shoe polish
ii. For making crayons used in painting
iii. For making candle wax
iv. To make varnish for furniture
v. To make cosmetics like body creams / Vaseline.

Advantages of keeping bees

i. Apiculture takes little space i.e. the land under the lives can be used for crop farming.
ii. Less labour and attention is needed since bees look for their own food.
iii. Bee farmers get regular income from bee products like honey.
iv. Bees pollinate flowers.

LESSON 10 AND 11

BEE ENEMIES AND DISEASES

Examples of bee pests include

Wood ants

Safari ants

Rats

Wasps

Wax moths

Diseases of bees

Bees are resistant to diseases but the following diseases can attack them:-

American foul brood

Stone brood

Bald brood

European foul brood

Nosema

How can we prevent enemies from destroying bees?

i. By oiling the base of the poles on which bees are.
ii. Putting grease on the wives to prevent the ants from climbing.
iii. Spraying insecticides at the base of poles to kill the pests.
iv. Keeping the grass around the hives short.
v. Hanging the hives in trees 100 – 150cm high.

TOPICAL QUESTIONS

……

WEEK 3

LESSON 1

THEME: MATTER AND ENERGY

TOPIC MEASUREMENT

It is the process of finding out how long, short, big, small, heavy or light an object is.

Mass

It is the amount or quantity of matter in an object.

It is measured in grams (g), kg (kilograms).

NB: Its standard unit is kg.

Gravity: Is the force of the earth that pulls down objects.or Is the force of attraction that objects have on one another because of their masses.

NB On earth the gravitational force acting on mass is 10N

The size of the force becomes smaller as the object moves further from the surface of the earth.

Length

- It is the distance between two point

- It is measured in metres (m), centimeters (cm) Hecto metres (hm), millimetrees (mm, decamitre (Dm) decimeters (dm).

NB: The standard units for length are **Metres**

Instruments used to measure length

i. Tape measures
ii. Metre rulers
iii. Foot rulers
iv. Sticks
v. Strings
vi. Strides

A line segment: Is a line between two points.

Activity

Learners draw line segments of different length.

a). 4cm b) 6cm c) 8cm d) 14cm

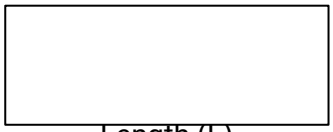
LESSON 2

AREA

It is the total space covered by an object.

It is measured in Square Units cm^2, m^2, dm^2, km^2.

Area of a rectangle



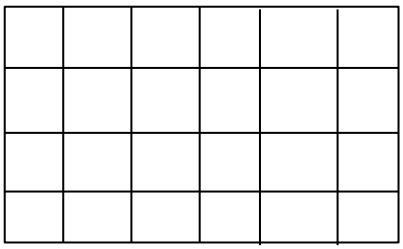
Width (w)

Length (L)

The width is the shorter side of a rectangle

The length is the longer side of a rectangle

Area = Length x Width = sq units



4 squares

6 squares

By counting the squares

24 squares

Area = L x W

= 6 squares x 4 squares

= 24 squares

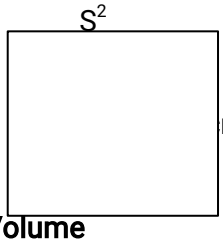
NB: A regular rectangle has two opposite sides equal.

Area of a square

A square has all its sides equal

Area = s x s

S^2



m

Area = s x s

= 4cm x 4cm

= $16cm^2$

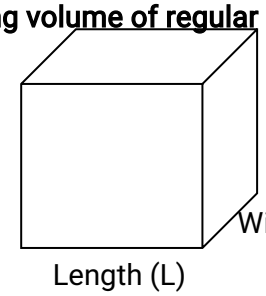
Volume

It is the space occupied by an object

It is measured in cubic units (cc, cm^2, mm^3, $m^{3))}$

Regular objects
They are objects with specific (definite) shapes e.g. cuboids, bricks, blocks, tins, rectangles, square etc

Finding volume of regular objects



V = L x W x H = Cubic units

Find the volume of the figure above.

Sample questions

…….

NB Set word problems as well.

LESSON 3

Irregular objects-

These are objects that do not have a specific shape e.g. stones

Displacement method

Is the method used to find the volume of irregular objects?

Instruments used to measure the volume of irregular objects

1. Measuring cylinder
2. An over flow can or Eureka can

Activity

Why do we use the displacement method to find the volume of stone?

It has no specific shape

Using a measuring cylinder to find the volume of an irregular object.

Procedure

Step I

Pour water into a measuring cylinder about half full and record the volume of the water.

Step II

Gently lower the irregular object tied on a string into the measuring cylinder.

Step III

Record the final level of the water in the measuring cylinder.

Step IV

Subtract the first level from the final level.

V = Final level – 1st level

V = 10cc – 5cc

V = 5cc

NB

The volume of the irregular object is equal to the volume of the displaced water.

Using an over flow can (Eureka can)

Step I

Pour water in the can up to the level of the spout

Step II

Put the irregular object tied on a thread gently in the can.

Step III

Collect the water that pours out of the can in a measuring cylinder

1. What is the volume of the stone?

   10cc

2. What is the use of the string (thread) in the experiment above? To gently lower the stone into the water and avoid it from splashing.

LESSON 4

Weight

3. It is the gravitational force exerted on an object by the earth.

The standard unit of weight is Newton

Mass

- It is the amount of matter on an object.
- It is the quantity of matter contained in a body.

Machines used to measure weight and mass

i. Beam balance
ii. Spring balance-weight
iii. Set of scale
iv. Scale of balance
v. Weighing balance

Difference between weight and mass

1. Mass does not change from place to place while weight changes.
2. Mass is the amount of matter in an object while weight is the force of gravity exerted on an object.
3. Mass is measured in kilograms while weight is measured in Newton (N).

Floating objects

Floating is when an object stays on top when thrown on water.

Objects float because they are less dense than water.

When an object floats in a fluid, two forces act on it; its own weght and upthrust force of the fluid.

Examples of floating objects

Cork	Feather	Petrol, paraffin
Plastic	Leaves	
Boats	Soft dry wood	
Sponge	Paper	

Sinking

It is when an object thrown on water goes to the bottom of the water.

Objects sink because they are more dense than water.

Examples of sinking objects

Stones	Metal	Coins
Sand	Glass	Pins
Soil	Nails	Clay
Keys		

NB: Any sinking objects displaces water equal to its volume.

LESSON 5

Density

It is the ratio of mass to volume of a substance or density of a substance is defined as its mass per unit volume.

The density of water is 1.0g/cc and ice is 0.92g/cc.

We use density bottle to measure densities of substance.

It is measured in units like (kg / cc, gm /cm^3, kg/m).

Activity

Find the density of an object with mass 400gm and volumes 20cc>

D = Mass (M)
Volume D

D = Mass
Volume

D

= 400gm
20

D = **20gm/**

Week 4

LESSON 1

IMMUNISATION

Immunization – is the administration/ introduction of vaccines into the body to cause immunity.

OR

Is a way of putting vaccines into the body in order to cause immunity.

IMMUNITY

Immunity is the body's ability to resist disease attack.

TYPES OF IMMUNITY

There are two types of immunity.

1. Natural immunity.
2. Artificial (acquired immunity)

Natural Immunity

Is the type of immunity a baby or a person gets without introduction of vaccines. This can be got through breast feeding, from mother to baby through the placenta.

Eating a balanced diet and develops as a result of infection.

The baby gets it as it develops in the mother's womb.

Artificial Immunity

Is the type of immunity a baby gets through receiving vaccines in the body.

After birth, a child is immunized and gets immunity.

VACCINES

Vaccines are medical substances which are introduced into the body to produce antibodies against certain diseases.

Vaccines take the form of dead or weakened bacteria or viruses that can still act as antigens.

Vaccines can be administered orally or through an injection.

ANTIBODIES

These are chemical substances produced by white blood cells to defend the body against diseases.

LESSON 2

TYPES OF VACCINES

There are three types of vaccines

i. Toxoids
ii. Attenuated vaccines
iii. Killed vaccines

Toxoids

There are prepared from toxins produced by bacteria in the body. They are made harmless and injected into the body like T.T vaccines.

Killed / Dead vaccines

These are killed bacteria or virus that has been grown in suitable host cells. They are made harmless before being injected into a person e.g. cholera and the sack anti polio vaccine.

Attenuated vaccines

These are live bacteria or virus which has been weakened in such a way that they can not cause diseases. When injected into the body, they cause immunity.

Importance of immunity to our body

Protects us from being attacked by diseases.

Boosts our body immune system.

How does baby get immunity?

i. From mother to child during development in the womb.
ii. Through immunization from vaccination.
iii. After suffering and recovering from an illness.

LESSON 3

CHILDHOOD IMMUNIZATION DISEASES

The six childhood killer diseases attack children below the age of six years.

These are:

- Poliomyelitis (Polio)
- Measles
- Tuberculosis
- Diphtheria
- Whooping cough (pertussis)
- Tetanus

Other Immunisable diseases

- Cholera
- Yellow fever
- Meningitis .e.t.c.
- Rabies
- Typhoid
- Small pox (already eradicated)
- Plague
- Hepatitis B
- Haemophilus
- Influenza B
- Rubella (Geman, measles)
- Typhus fever

DISEASES, CAUSE, SIGNS, SYMPTOMS, PREVENTATION AND TREATMENT

1. **Tuberculosis.**

Cause - bacteria (mycobacterium tuberculosis)

It usually attacks the lungs, bones, joints and the brain

How its spread.

Through air/coughing or sneezing

Signs (what is seen with our eyes)

- Chronic cough
- Loss of skin color
- Thick sputum

Note; Sputum is a liquid from the throat or lungs especially when it's coughed as out because of a disease.

Symptoms

- Mild fever
- Loss of appetite
- General body weakness
- Chest pain.

Treatments

- Use antibiotics

Prevention

- Immunize with(Bacillus Calmette-Bwerine) BCG vaccine.
- Eats a balanced diet
- Avoid sharing, cutting, cups, plates
- Isolation of sick people
- Drinking properly boiled milk

LESSON 4

2. Measles

Caused by virus

Measles is spread by contact with the nose or throat secretions of infected people and in air borne droplets.

Signs

- Sore in the mouth
- Runny nose
- Skin rash
- Dry cough
- Red eyes

Symptoms

- High temperature (fever)
- Itching skins
- Body weakness

Prevention

- Isolation of infected persons.
- Immunize with measles vaccine at 9 months after birth

Treatment

There is no proper treatment but we can control symptoms

3. Whooping cough (pertussis)

It's a respiratory disease caused by a bacteria called Boraletella Pertussis.

Its spread through droplet infection (coughing and sneezing)

Signs

- Running nose
- Severe coughing with spells that end with whoops
- Watery discharge from eyes, sneezing.
- Quick deep breath
- Mild cough.

Symptoms

- Fever
- A cold

Treatment

Treat with anti biotic

4. Diphtheria

Caused by bacteria

Signs

- Swollen neck
- Sore throat

Prevention

- Immunize with D P T vaccine
- Isolation of infected persons.

Treatment

Use antibiotics

LESSON 5

5. Tetanus

Caused by bacteria called Clostridium tetani.

Signs

- Stiff muscles all over the body especially the jaws
- Sudden and strong muscles that spasm when touched
- Baby stops suckling
- Difficulty in swallowing.

Symptoms

- Fever

Prevention / Treatment

- Immunize with D P T vaccine
- Immunize with TT vaccine for females between 15 – 49 years

6. Poliomyelitis (polio)

Caused by a virus

Its spread through drinking or eating contaminated water and food

Signs

- Paralysis in the limbs (legs / hands)

Prevention of polio

- Drinking boiled water
- Proper disposal of faeces
- Immunize with polio vaccine

Symptoms

- High fever
- Weakness of the body

Other Immunisable diseases

CHOLERA

- Caused by bacteria
- Spread through drinking contaminated water
- Spread through eating contaminated food.

Signs

- Excessive diarrhea

- Excessive vomiting

Treatment

- Give ORS
- Give fluids like juice, waters and milk.
- Take to the health centre.

Prevention

- Drinking boiled water
- Wash hands before handling food
- Ensure proper disposal of refuse
- Ensure proper of latrines
- Cover all cooked food and leftovers
- Prepare food in a clean place and eat it from a clean container.
- Observe general cleanliness of both body and environment

LESSON 6

HEPATITIS B

Its caused by Hepatitis B virus.

It affects the liver.

Spread by contact with blood of an infected person.

Symptoms

Body weakness

Stomach upset

Signs

Very dark urine

Very pale stool

No treatment

Prevention

Immunize with Hepatitis B antibiotics(Hepatitis B serum) HIB vaccine

	AGE	VACCINE	DISEASE	METHOD OF IMMUNIZATION
a	At birth	BCG & Polio vaccine	Tuberculosis polio	Injection-right upper arm Drops in the mouth
b	6 weeks	DPT vaccine Polio vaccine	Diphtheria Pertussis Tetanus Poliomyelitis	Injection on the left upper thigh Drops in the mouth
c	10 weeks	DPT vaccine polio	Diphtheria Pertussis Tetanus Poliomyelitis	Injection on the left upper thigh Drops in the mouth
d	14 weeks	DPT vaccine & Polio	Diphtheria Pertussis Tetanus Poliomyelitis	Injection on the left upper thigh

		vaccine		Drops in the mouth
e	9 months 36 weeks	Measles vaccine	Measles	Injection on the left upper arm.

IMMUNIZATION SITES

LESSON 7

IMMUNIZATION CARD (C H C) CHILD HEALTH CARD

This is a card given by health workers at a health centre to every child (baby) who receives immunization

A child health card shows the following information about a baby

1. Date of birth (D.O.B)
2. Date of next visit for immunization
3. Vaccine received and date
4. Birth weight of the child
5. Child's name
6. Parent's name, place of residence, parent's occupation.
7. Birth order
8. Doctor's advice to health growth and nutrition of the child.

Importance of immunization

1. Helps to remind the parent of the next date of visit for immunization
2. Helps the parent to monitor the child growth
3. Helps both the doctor and the parent to know which vaccine was already given and which one is remaining.

LESSON 8

Roles of individual families and communities in immunization

a) Individuals

- Helps to inform other family members and neighbors on immunization dates and venue.
- Learning how to immunize so that they can help the health workers.
- Help to accept and convince other people to accept immunization as an important programme
- Encourage others to take their children for immunization.
- Assisting health workers in arranging the places selected for immunization

b) Family

- Share all information that they know about immunization.

- Parents should make sure that all children and pregnant women are immunized.
- Bigger children should take younger ones for immunization

c) Community

- Organize seminars, workshops, plays and concerts to educate others about immunization
- Schools should perform plays and concerts about immunization on open days and speech days.

NOTE: The common immunization centers in our communities include; hospital, clinics, dispensaries, health centers etc.

Week 5

LESSON 1 AND 2

THEME HUMAN BODY

TOPIC: THE DIGESTIVE SYSTEM

DIGESTION – Is a process by which food is broken into simple forms that can be absorbed in the blood stream.

THE DIGESTION SYSTEM

Is a group of parts which work together to digest food in the body.

The alimentary canal (digestive gut)

Is the tube in the body of animals in which food moves by peristalsis

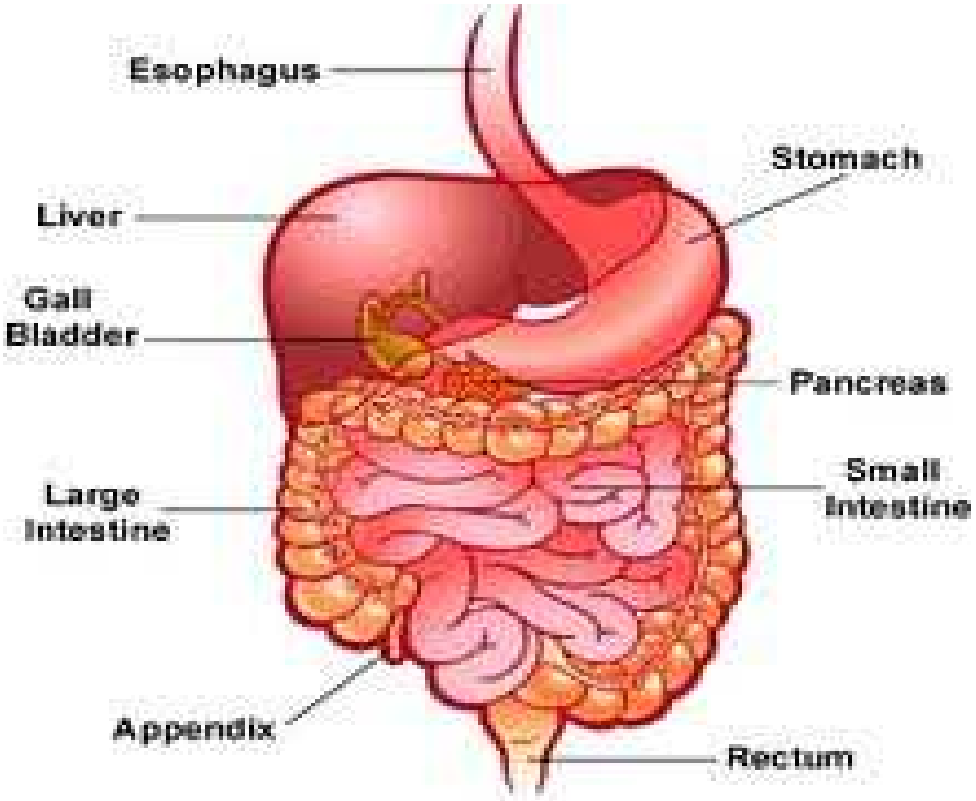
Alimentary canal

Is the muscular tube that runs from the mouth to the anus.

Parts of the alimentary canal

- Mouth
- Gullet Colon
- Appendix
- Rectum
- Pancreas
- Liver
- Appendix
- Rectum
- Pancreas
- Liver

THE DIGESTIVE SYSTEM OF MAN;



LESSON 3

Uses of the parts of the digestive system

1. **Mouth**

- It is where digestion begins.
- Food is broken into simpler forms.
- Food is mixed with saliva to make it soft for easy swallowing.

Saliva

- It is a digestive juice produced by the salivary glands in the mouth
- It has an enzyme called salivary amylase or ptyalin.
- Ptyalin breaks down starch into maltose.
- It also has mucus which lubricates the food.

2. **The tongue**

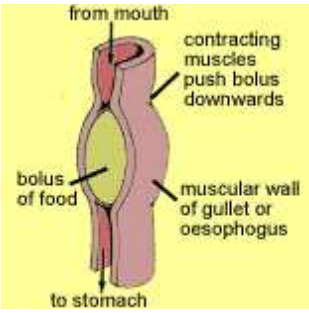
- It rolls food into bolus
- It is used for tasting.
- It pushes the food into the gullet

3. **Gullet (oesophagus)**

It leads food from the mouth to the stomach.

Food passed through the gullet by the process of peristalsis.

Illustration of peristalsis.



4. **Epiglottis**

- It prevents food from entering the wind pipe.

5. **Stomach**

- It keeps food for 1-4hrs depending on the type of food.
- The stomach walls produce the gastric juice and hydrochlonic acid

  Hydrochlonic acid – kills most of the germs brought by the food into the stomach.
- The gastric juice enzymes that start the digestion of proteins.

  Alcohol is absorbed in the stomach.

6. **The duodenum**

- It is the first section of the small intestine.
- It receives bile juice and pancreatic juice through the pancreatic duct.

7. **The liver**

- It produces the bile juice

8. **Gall bladder**

- It keeps or stores the bile juice.
- Bile has salts that breaks (emulsify) fats for easy digestion.

9. **The pancreas**

- It produces the pancreatic juice.
- The pancreatic juice has enzymes that complete the digestion of carbohydrates, proteins and fats.

10. **The Small intestines**

- It is the second part of the small intestine
- It is where the digestion of food ends.
- It is where the absorption of food takes place.

Absorption

- Is a process by which digested food is taken into the blood stream.
- The lleum has finger like projection called the vilil
- The villi absorbs food
- The walls of the lleum produce a juice called intestinal juice that completes the digestion of food.

How the small intestines is adapted to its function

- It has a large surface area made of villi and micro villi
- It has a lot of blood capillaries which allow the transportation of blood molecules all over the body.

The large intestine (colon)

- It is where water and mineral salts are absorbed or take place

Rectum

- It keeps the undigested waste materials before they are passed out

Anus

- It passes out the undigested materials
- It is used for digestion

Components of faeces

- Water
- Dead cells
- roughage
- Bacteria

LESSON 4

Disorder and disease of the digestive system

Disorder

They are problems that can make the alimentary canal fail function well.

Constipation

It is when the undigested matter stays in the rectum for too long.

Causes

- Lock of roughage in the diet
- Drinking little water
- Lack of physical exercise

How to prevent constipation

- Eat fruits and vegetables e.g. mangoes, apples e.t.c.
- Doing plenty of physical exercises.
- Drinking water before and after eating food.
- Eating a balanced diet.

B) Indigestion

It occurs when the food we eat is not properly digested

Causes of indigestion

- Improper chewing of food
- Over eating

Symptoms of indigestion

- Stomach ache
- Heart burns
- Tiredness/ fatigue

Prevention of indigestion

i. Chewing food properly before swallowing.
ii. Drinking enough water before and after eating food.

Vomiting

i. It is a disorder caused eating poisonous food or over eating
ii. It can also be caused due to some diseases e.g. malaria

LESSON 5

Diseases of the digestive system

1. **Appendicitis**

- It is caused by bacteria that enters the appendix
- It leads to swelling of the appendix
- It causes too much pain in the lower right side of the abdomen.
- It can be treated by cutting it off.

2. **cholera**

- cholera is used by bacteria
- it is spread by houseflies, cockroaches.
- It is also spread by drinking contaminated water, eating contaminated food.

Symptoms of cholera

Pain around the abdomen

Control of cholera

i. Boil water before drinking it.

ii. Kill houseflies by spraying
iii. Wash hands before eating, serving or handling food.
iv. Wash hands after visiting the toilet or latrine
v. Cover cooked food to keep away houseflies.
vi. Properly dispose human faeces

3. Typhoid

i. It is caused by bacteria
ii. It can be spread by house flies
iii. Typhoid can be spread by drinking contaminated water and eating dirty food

Signs of typhoid

- Diarrhea

Symptoms of typhoid

- Headache
- Fever

Prevention of typhoid

- Boiling water for drinking
- Spraying insecticides to kill houseflies
- Washing hands before eating food
- Wash hands after visiting the latrine or toilet
- Properly disposing rubbish and faeces

4. Dysentery

- The frequent passing out of watery stool with blood stains.
- Amoebic dysentery is caused by amoeba.
- Bacillary dysentery is caused by a bacteria

Spread of dysentery

i. Drinking contaminated water
ii. Eating contaminated food
iii. Houseflies carry germs onto the food and hands.

Control of dysentery

i. Boiling water for drinking
ii. Washing fruits before eating them
iii. Spraying insecticides to kill houseflies
iv. Washing hands before eating, serving food
v. Wash hands after visiting the toilets

Dangers of dysentery

i. It leads to dehydration

ii. It leads to anaemia

5. Peptic ulcers (stomach ulcers)

- They are wounds formed in the stomach or small intestine
- They cause a lot of pain especially when one is hungry

LESSON 5 AND 6

CARE FOR THE ALIMENTARY CANAL

i. Wash hands before eating

ii. Chew food properly before swallowing it

iii. Wash hands after visiting a toilet or latrine

iv. Eat well looked food

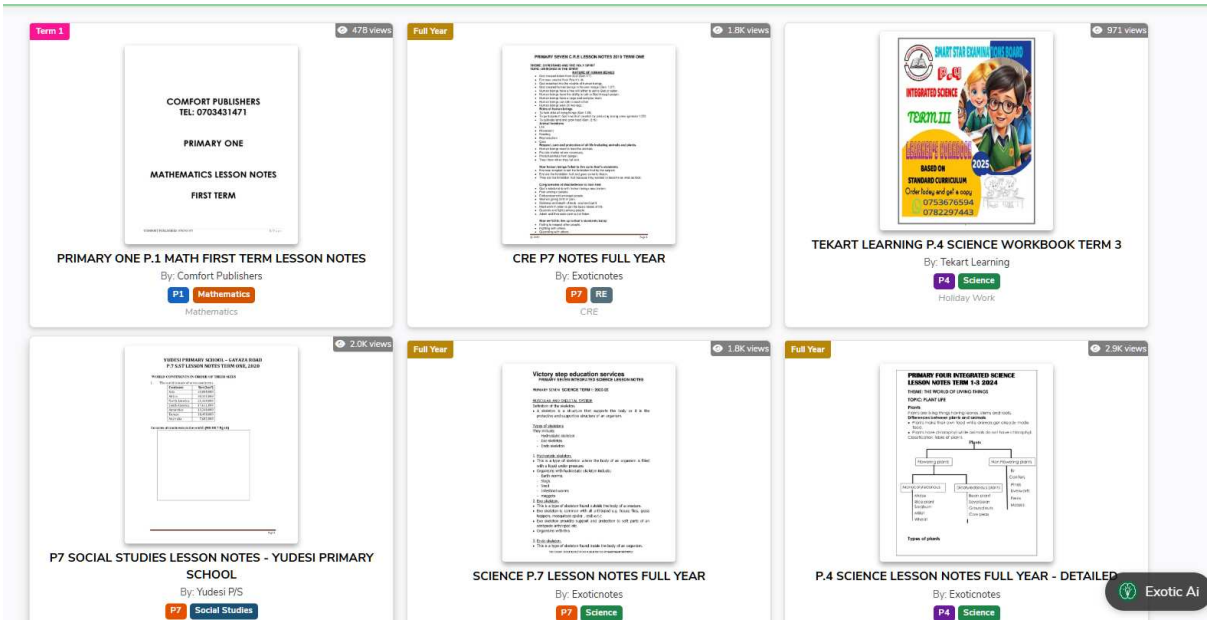
v. Avoid eating very hot or cold food

vi. Having regular physical exercise

vii. Having enough rest after eating

viii. Brushing the teeth after eating food

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