

SCIENCE LESSON NOTES FOR PRIMARY SIX

CLASSIFICATION OF LIVING THINGS

- ✓ Living things are things which have got life.
  Or
- ✓ Living things are things which carry out life processes e.g. respiration, excretion and respiration.
- ✓ Living things are also called animates.
- ✓ Non-living things are also called inanimate

Characteristics of living things

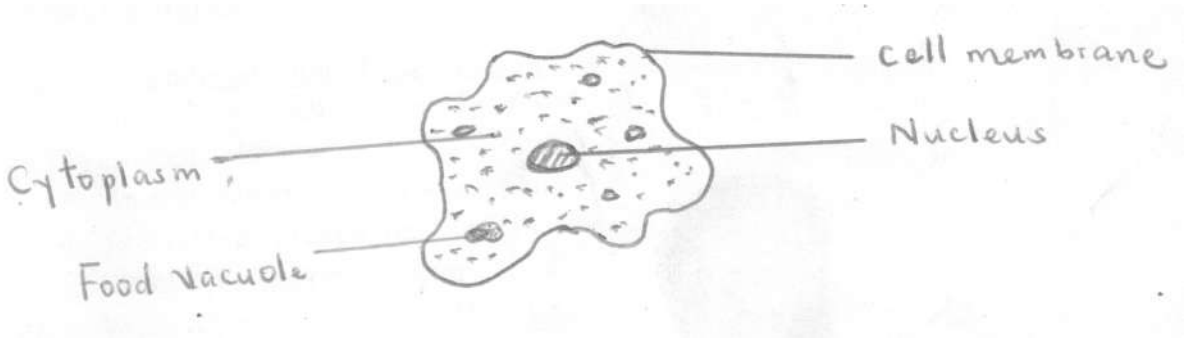
1. They reproduce
2. hey grow
3. They respire
4. They excrete
5. They move (locomote)
6. They have cells
7. They respond to stimuli (They are sensitive)
8. They feed

A cell is a smallest functional unit of a living organism.

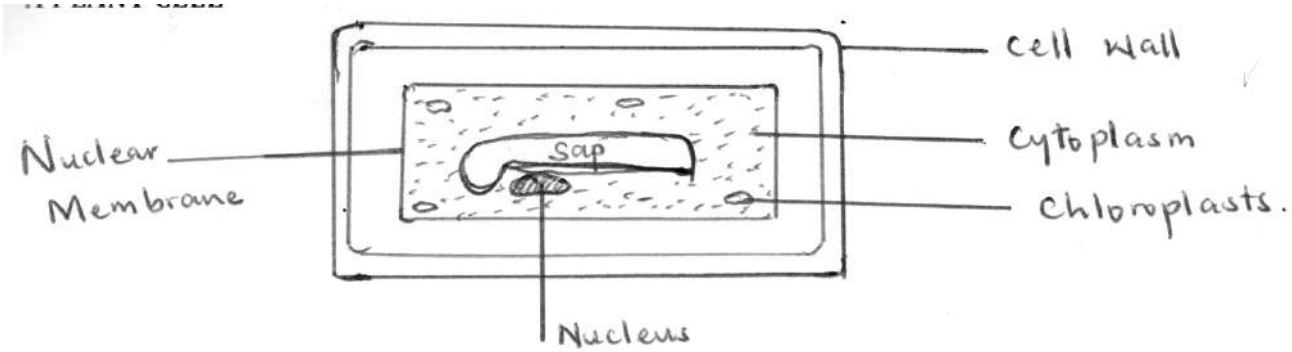
NB: Living things reproduce in order to multiply or increase in number.

- Respiration is the process by which food is broken down in the body cells to release energy.
- Respiration enables living organisms to get energy and also excrete carbondioxide and water vapour.
- Excretion is the process by which the waste products of metabolism are removed from the body.
- Excretion enables living things to get rid of waste products before they become toxic to the body.

ANIMAL CELL



A PLANT CELL



Respiration is the body cell occurs in an area called Mitochondria.

<u>Differences between the plants and animals.</u>

	Plants	Animals
1	They have chlorophyll	They lack chlorophyll
2	They make their own food (They feed autotrophically)	They can't make their own food. (They feed holozoically)
3	They have slow response to stimuli	They have quick response to stimuli
4	Growth only occurs on the tips of the roots and shoots	Growth occurs in all parts of the animals' body
5	They lack sense organs	They have sense organs
6	Their cells have cell walls Their cells have chloroplasts	Their cells don't have cell walls Their cells don't have chloroplasts

KINGDOMS OF LIVING THINGS

1. Animal kingdom
2. Plant kingdom
3. bacteria kingdom (Monera kingdom)
4. Fungi kingdom
5. Protoctista kingdom (single called organisms)

NB: A kingdom is the highest rank in the classification of living things.

ANIMAL KINGDOM

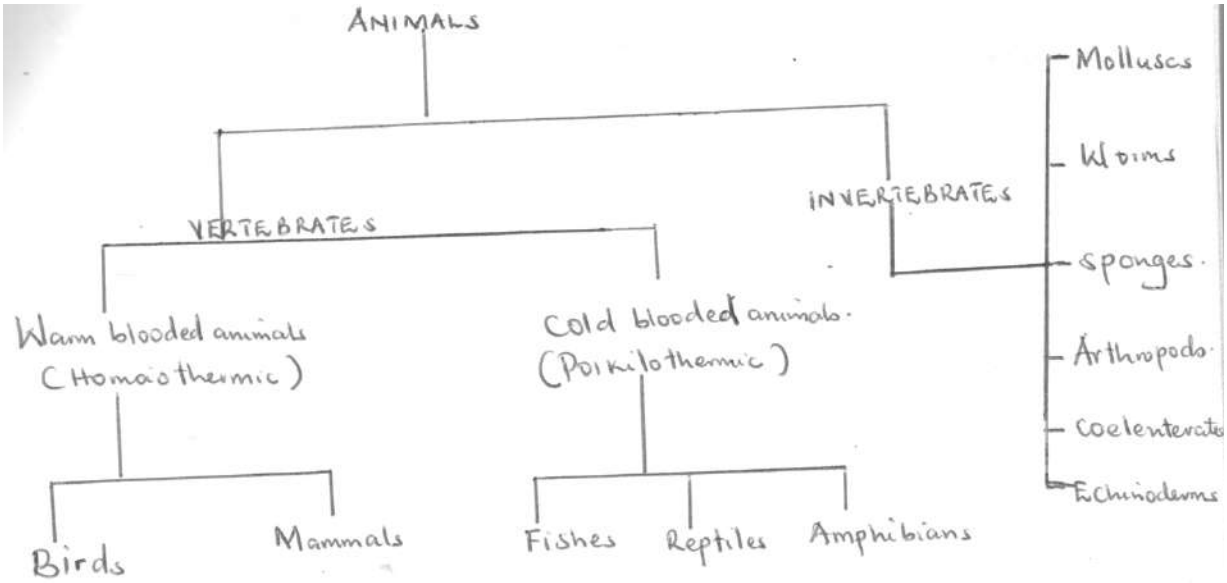
Factors considered when classifying animals

1. Animal feeding habits (mode of feeding)
2. Animal habitats
3. Animal way or mode of movement
4. Animal type of skeleton
5. Animal mode of reparation
6. Animal body structure and features

Animals are classified into two main groups namely:

1. Vertebrates (craniates/chordates)
2. Invertebrates (non-vertebrates)

The table showing the way animals are classified



NB: Classification is an act of grouping things basing on their common characteristics and features.

Vertebrates

Vertebrates are animals with a back bone (vertebral column)

Invertebrates are animals without a back bone.

Examples of vertebrates

man, pig, goat, monkey, snake, fish, frog, bat, etc

Examples of invertebrates

tsetsefly, mosquitoes, snails, octopus, Earth worm, spider, scorpions, slugs, oysters, jelly fish

Activity

1. Give two reasons why animals move from one place to another.
2. Why is reproduction important to living things?
3. Which type of feeding is characterized by animals?
4. How are animals different from plants in terms of feeding?
5. State the difference between vertebrates and invertebrates.
6. How is the reproduction of bacteria different from that of mushrooms?
7. What are single celled organisms?
8. Give two examples of unicellular organisms.
9. How useful is the nuclear to the cell?
10. Where does respiration take place in the organism?
11. State the importance of chlorophyll to the plants.
12. Why can't mushrooms make their own food?
13. Which type of nutrition do most fungi undergo?

Characteristics of vertebrates

1. They have a back bone (vertebral column)
2. They mostly have an endo skeleton
3. They have an alimentary canal
4. They have the water proof skins
5. They have blood coloured red and pumped by the heart to all body parts
6. They have two pairs of limbs or fins foe locomotion apart from the snakes.
7. They have a large brain protected by the skull

Groups of vertebrates

Vertebrates are grouped into two main categories i.e

i) Homoeothermic animals (warm blooded animals)
ii) Poikilothermic animals (cold blooded animals)

Warm blooded animals
These are animals with a constant body temperature.

Groups of warm blooded animals

1. Mammals
2. Birds

Cold blooded vertebrates:

These are animals whose body temperature changes or varies according to the temperature in their environment.

Such animals their body temperatures are not constant.

Groups of cold blooded animals

1. Fish
2. Reptiles
3. Amphibians

Therefore there are five groups of vertebrates namely:

Mammals, Birds, Fish, Amphibians, Reptiles

FISH

These are cold blooded vertebrates that live in water and use fins for swimming.

Characteristics of fish

1. They are cold blooded
2. They respire by means of gills
3. Most of them scaled slippery bodies
4. They reproduce by laying eggs (oviparous)
5. They have streamlined body shape which help them to reduce viscosity friction during swimming
6. They have fins for swimming and protection
7. They undergo external fertilization
8. They have the lateral line for detecting movements in water
9. They have nostrils for smelling in water
10. The fish only lives in water (it is aquatic animal)

    A streamlined body is the body shape with the pointed ends.

11. Fish has got two chambered heart

Examples of objects with streamlined shape

1. fish
2. areoplanes
3. boat
4. crocodiles
5. birds
6. spear
7. whale
8. dolphins
9.



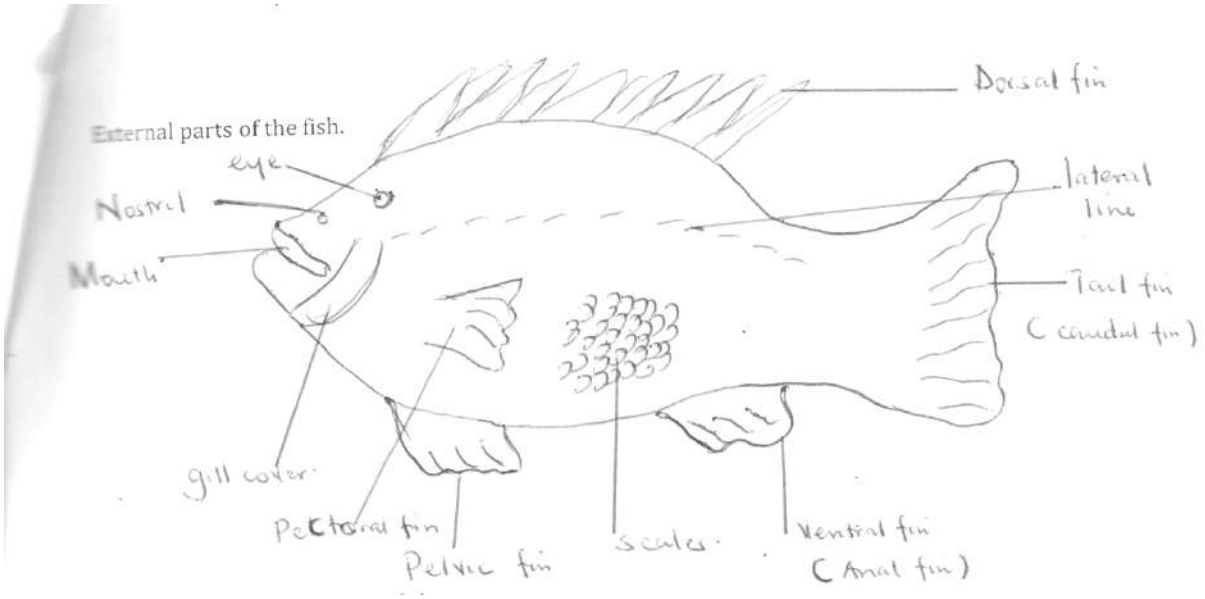
A streamlined body shape enables the fish to reduce the viscosity friction during swimming in water.

Viscosity friction: is the force that opposes motion in gases and liquids.

A fish can only use gills to trap the dissolved oxygen for breathing in water and when it is removed from water it dies after sometime.

On land the fish lack oxygen to be used by the gills for breathing.

External parts of the fish.



Functions of each part of the fish.

1. Nostrils: They are used by fish for smelling food substances in water.
2. Eyes: They enable the fish to see while in water.
3. Paired fins: These include the pectoral fins and pelvic fins
   - ✓ Pectoral fins and pelvic fin are used by the fins to slow down or to brake during swimming.
   - ✓ They also prevent the fish from rolling in water during swimming.
   - ✓ Pectoral fin and pelvic fin also enable the fish to swim upwards and down wards.
4. Median fin (Dorsal fin and ventral fin)

   They enable the fish to balance in water during swimming.

Dorsal fin is also used by the fish for protection by piercing the enemies.

5. Candal fin: It is used by the fish to swim forward and change direction during swimming.
6. Lateral line: It is used by the fish to detect enemies in water by picking the movements using water waves.
7. Gills: They are used by the fish for breathing by absorbing the oxygen dissolved in water.
8. Gill cover (operculum): They cover and protect the fish's gills from physical damage.
9. Scales: They cover and protect the fish's body against injuries or scratches.
10. Mouth: It lets in food.
    - It lets in water containing oxygen that is trapped by gills during breathing.
11. Swim bladder: It is an air filled space in some fish which enables the fish to stay buoyant in water. It controls the depth at which the fish is swimming.

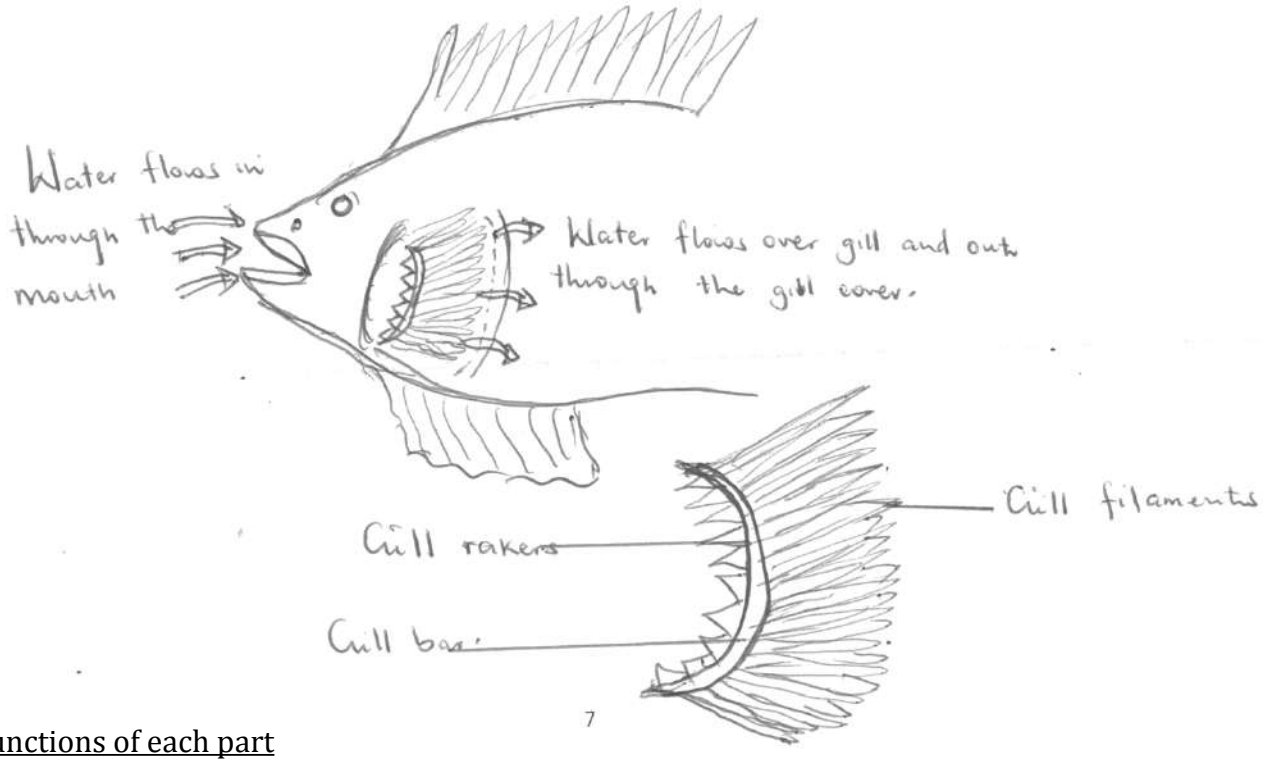
Activity

1. How does the fish respire?
2. Which type of fertilization does the fish undergo?
3. In which way are feelers similar to the lateral line of the fish?
4. What are oviparous animals?
5. How is the fish's body protected from damage?
6. Why does the fish die shortly after being removed from water?
7. State the importance of the swim bladder to the tilapia fish.
8. How are fins useful to the fish?
9. Which food value is mainly obtained from eating the fish?
10. How does external fertilization occur in the fish?
11. Why is the fish's body streamlines useful to the fish during swimming?
12. In which way are nostrils useful to the fish in water?
13. Identify the force that retards the fish's speed of swimming in water.

RESPIRATORY SYSTEM OF THE FISH

- The fish respires by means of gills
- The mouth lets in water with dissolved oxygen which is trapped by the gill filaments.

Then the operculum opens to let out the water.



Functions of each part

1. Gill rakers: They trap sold materials swallowed with water to prevent damage of the gill filaments.
2. Gill bar: It gives the attachment for the gill filaments and gill rakers.
3. Gill filaments: It is where gaseous exchange occurs

NB: The gills are adapted to gaseous exchange because they have got very many gill filaments which increase the surface area for gaseous exchange.

The fish dies shortly after being removed from water because it can only use gills to trap the dissolved oxygen in water.

FEEDING IN FISH

- Most fish are vegetarians, therefore they feed on algae and other water plants (planktons)
- Some fish are carnivorous i.e they feed on other water animals like small fish, insects, worms and frogs.

  After feeding, the food goes through the alimentary canal to the stomach where the enzymes act on it.

REPRODUCTION IN FISH

- The fish reproduce by laying eggs.
- The female fish lays eggs in water and the male one sheds sperms on them and the eggs become fertilized externally. Therefore, the fish undergoes external fertilization.

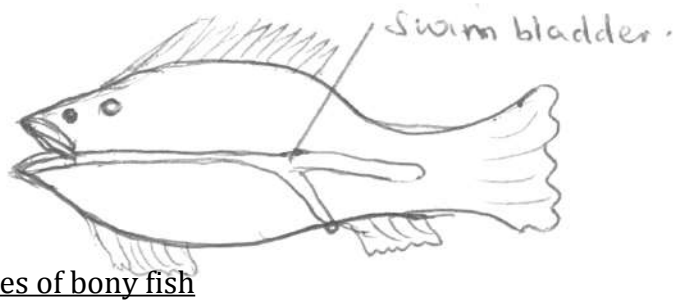
- The young fish is called Alevin.
- The group of young fish is called fry or fingerling

TYPES OF FISH

1. Bony fish
2. Cartilaginous fish
3. Lung fish

BONY FISH

- ✓ Their bodies are covered with overlapping scales.
- ✓ Their gills are covered with gill cover.
- ✓ They have the swim bladder in order to keep them buoyant in water



Examples of bony fish

1. Tilapia fish
2. Herrings
3. Nile perch
4. Pike
5. Trout
6. Salmon fish

CARTILAGINOUS FISH

- ✓ They have tough and spiny scales
- ✓ They do not have gill cover but instead they have gill slits on the surface of their bodies.
- ✓ They don't have true bones i.e their skeleton is soft or cartilaginous
- ✓ They have eyelids
- ✓ They don't have the swim bladder

Examples of cartilaginous fish

1. Dog fish
2. Skates
3. Rays

LUNG FISH

- ✓ They have swim bladder and gill covers.
- ✓ They live in dirty pools and swamps.
- ✓ They have long thin pectoral and pelvic fins

✓ They hibernate in dry season

HIBERNATION

This is the tendance of the animals staying inactive due to the changes in the temperatures of the surrounding.

Examples of lung fish

1. Common lung fish
2. Dipon

Ways how the fish protect themselves.

1. The fish's body is covered and protected from injuries by the scales.
2. The fish has got the lateral line which helps it to detect danger by detecting the movements of enemies in water.
3. The fish uses the dorsal fin to pierce its enemies and use other fins to swim and escape from the enemies.
4. Some fish have got electric organs which produce high voltage of electricity to shock their enemies.
5. Some fish inject poison in the enemies bodies.
6. A fish has got the slippery body which enable it to easily escape when caught by an enemy in water.
7. Some fish have got different shades of colours in order to hide from their enemies.

Adoptions of the fish to living in water successfully.

1. The fish's body is streamlined to enable it swim smoothly in water.
2. They fish has got fins for swimming and protection against enemies.
3. Some fin has got the swim bladder which help to keep the fish buoyant in water.
4. Fish has got the lateral line to detect danger in water.
5. The fish's body is covered and protected from injuries by scales.
6. The fish has got the slippery body that enable it easily escape from enemies.
7. The fish have got gills for breathing in the dissolved oxygen in water.

Importance or uses of fish to man

1. Fish is a source of proteins to man.
2. Fish is a source of bones used for making glue and poultry feeds that provide.
3. Fish is a source of income once it is sold.
4. Fish is a source of employment to man like fishermen.
5. It helps to control the breeding of mosquitoes by feeding on the mosquito larvae ponds.
6. Fish is used locally as medicine for measles.
7. Fish is the source of foreign exchange when it is exported.
8. Fish is used for decoration in aquarium at home and in offices.

Activity:

1. What is an aquarium?
2. How can fish introduced in the pond help to control mosquitoes at home?
3. State the economic importance of rearing fish.
4. In which way is algae useful in aquarium?
5. Why can't the fish stay alive on land?
6. In which way is fish rearing beneficial to the poultry project?
7. What is hibernation?
8. In which way is the fish able to reduce the viscosity friction during swimming?
9. Identify any one disease controlled through eating fish.
10. State the importance of plankton to the fish.
11. Why is the fish included in the child's diet?
12. Point out one way the fish defends itself against enemies in water.
13. State one way the fish is adapted to swimming successfully in water.
14. Why does the fish die when its gills are removed or damaged?
15. The fish is said to be oviparous. Give the reason for this.

REPTILES

Reptiles come from the Greek word Reptalia which means crawlers.

Qtn: What ate reptiles?

Reptiles are cold blooded vertebrates that moves by crawling.

Reptiles have 4 limbs apart from the snakes which are limbless.

Examples of Reptiles

1. Snakes
2. Crocodiles
3. Geckos
4. Tortoise
5. Chameleons
6. Lizards
7. Alligators
8. Turtles
9. Terrapins

Characteristics of reptiles

1. They are cold blooded (poikilothermic) animals.
2. They have scaled bodies
3. They respire by means of lungs
4. They undergo internal fertilization

5. They have the water proof skins
6. They have a three chambered heart i.e 2 auricles and one ventricle
7. Reptiles do not care after their young ones
8. Most reptiles reproduce by laying eggs which are hard shelled
9. They have external ears
10. They have teeth which is almost the same
11. Reptiles are four limbed apart from the snakes which are limbless

Groups of Reptiles

Reptiles are classifies into 4 groups, namely:

1. Lizards
2. crocodiles and alligators
3. Tortoise and turtles
4. Snakes

LIZARDS

Characteristics of Lizards

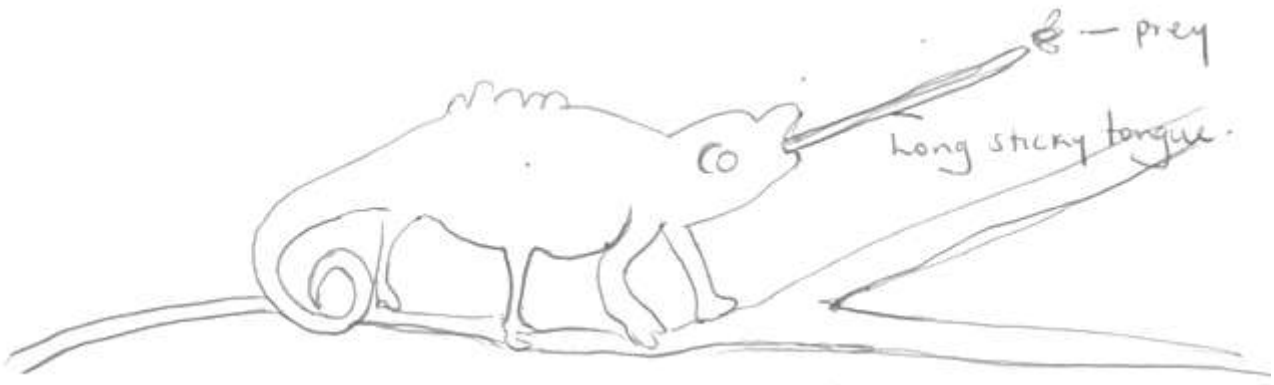
- ✓ They have 4 limbs
- ✓ They have 4 movable eyelids
- ✓ They have a fleshy tongue

Examples of lizards

1. Chameleons
2. Monitor lizards
3. Collared lizards
4. The six lined race runner
5. Common lizards
6. Geckos
7. Austrian frilled lizards
8. Monster lizard
9. Komado Dragon lizard

NB: All lizards are harmless apart from the monster lizard which have got the poison glands

Komado Dragon lizard is the biggest lizard in the whole world.



Chameleons camouflage or change their colours to resemble the surroundings because of the following reasons.

- To protect themselves from enemies
- To easily get their prey

A chameleon is able to trap its prey easily because it has a long sticky tongue.
Camouflaging in chameleons is an act of changing columns by chameleons to resemble the nearby surrounding.
NB:

- Geckos are yellow brown lizards that live in trees and houses. They have suction cups in their feet that enable them climb walls and trees.

CROCODILES AND ALLIGATORS

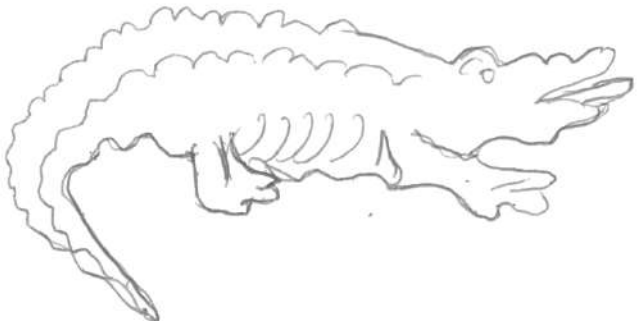
- These are the largest and most dangers reptiles.
- They are carnivorous i.e they feed on flesh of animals
- They have strong scaled backs
- They live on both land and in water depending on changes in atmospheric temperatures.
- They lay their eggs and they cover then in sand near water bodies and the eggs are hat ched by the help of the heat from the sun.
- They have long tails which they use for protection and swimming in water.

How crocodiles protect themselves.

1. By using their strong tails to hit their enemies.
2. By biting their enemies using their sharp jaws and teeth.

NB: Crocodiles open their mouth and expose their tongue and trap houseflies which land on it.

A crocodile



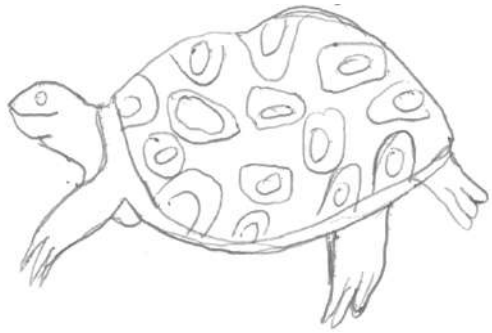
TURTLES AND TORTOISE

- They have hard shells on their bodies where they hide for protection.

- They always live in water but they always come on land to get food and also lay eggs
- Turtles have got webbed toes for swimming and peddling on water
- They lay eggs and hide them in sand which are hatched by heat from the sun
- They feed on small plants and small animals and insects

NB:
Turtles and tortoises protect themselves by hiding their legs and heads in their hard shells around their bodies.
Turtles' limbs are modifies into flippers for swimming unlike the tortoise.

A tortoise



Activity:

1. Why is a tortoise said to be a vertebrate?
2. State two differences between the reptiles and fish.
3. Outline two similarities between the fish and the reptiles.
4. How is the fish different from the reptiles interms of fertilization?
5. In which way are hard shells useful to the tortoise?
6. State one difference between turtles and the tortoise.
7. Why is camouflaging useful to chameleons?
8. How are Geckos and common lizards able to walk?
9. To which group of reptiles are chameleons classified?
10. How do turtles and tortoise protect themselves?
11. In which way do reptiles help to control the spread of some diseases to people?
12. State one importance of the tail to the crocodiles.
13. How does the crocodile protect itself from enemies?
14. How are the eggs laid by fish differ from those laid by the reptiles?

SNAKES

Snakes are limbless reptiles that move by gliding or slithering.

Gliding is the animal movement by concentration of body muscles.

Characteristics of snakes

1. They are limbless
2. They move by gliding or concentration of body muscles
3. They are able to sense danger by using the ear drum to detect sound waves on the ground.
4. They are mainly carnivorous
5. They always undergo moulting or ecdysis in order to increase in size
6. They have the forked tongue for smelling and tasting food
7. They have many ribs and vertebrae
8. They don't have eyelids
9. They have backward pointing teeth
10. They mostly protect themselves by biting their enemies

Types of snakes

There are three types if snakes

1. Poisonous snakes
2. Non-poisonous snakes
3. Constrictor snakes

NON-POISONOUS SNAKES

These are snakes which don't have poison gland and fangs

Characteristics of non-poisonous snakes

1. They don't have fangs
2. They have sold teeth which they use for biting but they don't produce venon
3. They eat rats, mice, frogs and other small snakes
4. They move faster
5. They kill their prey and swallow them as a whole
6. They don't have poison gland and can't produce venom

Examples of Non-poisonous snakes

1. Green grass snakes
2. Egg eating snakes
3. House snakes
4. Tree snakes

POISONOUS SNAKES

- These are snakes with poison glands and fangs.

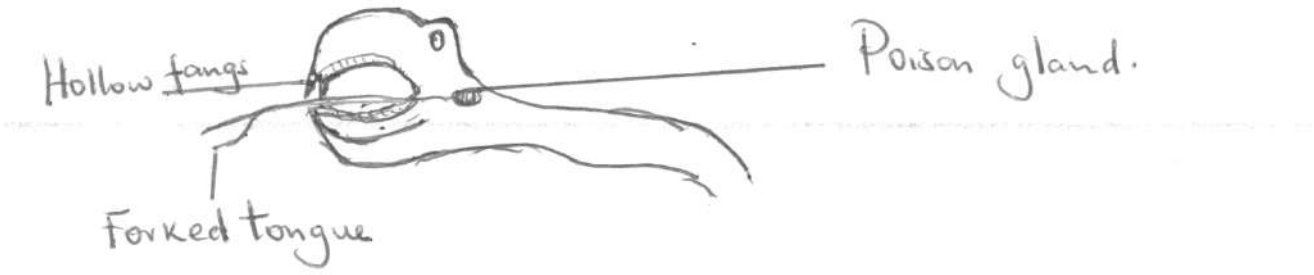
- They bite their enemies and inject venom in the bitten part using the hollow fangs

NB:

Fangs: These are hollow teeth for a poisonous snake.

Venom: This is a poisonous liquid (fluid) snakes inject in the body of the enemy to hurt them.

The structure of the head for a poisonous snake



Fangs: They are used to inject venom in the enemies' body.

Forked tongue: It is used by snakes for tasting food and smelling.

Poison gland: It stores and produces the venom

Examples of poisonous snakes

1. Black mamba
2. Green mamba
3. Cobra
4. Puff adder
5. Horn vipers
6. Gaboon vipers
7. Boomslungs

Characteristics of poisonous snakes

1. They have poison glands and produce venom
2. They move slowly
3. They leave two marks in the bitten part
4. They move when their forked tongue is suspended out
5. They have shining skins
6. They first kill their pray before swallowing them
7. They have one pair of poison fangs (hollow teeth)
8. They have triangular heads

NB: Snakes are defensive but not offensive because they only bite for protection.

- Every snake has got its own kind of venom
- Some snakes like cobras can bite or spit venom to the enemy which can make the enemy blind.

- Not all snakes reproduce by laying eggs, some snakes give birth to their young ones like puff adders.

First aid for a snake bite

The following steps can be taken when giving the first aid for a person with a snake bite.

1. First kill the snake to identify if it was a poisonous snake or a non-poisonous snake by checking its fangs.
2. Tie the tourniquet between the bitten part and the heart but near the area bitten.
3. Keep on releasing the tourniquet for a short time.
4. Make small cuts on the bitten part using the razorblade.
5. If you don't have the wound in the mouth, suck the blood from the cut area and spit it or apply the black stone to suck out the venom

NB:

Avoid moving the bitten part to prevent faster movement of blood with venom to the heart.

- When the venom reaches the heart it makes the heart muscles paralysed and the persons shortly dies.
- The snake must be killed and taken along with the patient to the hospital for the doctor to identify the right serum (anti venom) against the bite.
- Anti venom or serum is a drug given against the snake bite.
- We always tie the tourniquet to prevent blood from carrying venom to the heart.

CONSTRICTOR SNAKES

These are very big non-poisonous snakes which kill their prey by coiling around them and squeezing them using their strong elastic muscles to suffocate them to death.

They lick their killed prey it makes them smooth or slippery for easy swallowing.

They have well developed teeth

Examples of constrictor snakes

1. Anaconda
2. Pythons
3. Boas

Advantages of reptiles to man

1. Reptiles are source of skins used for making leather products like bags, belts, drums, shoes.
2. Some reptiles like snakes and crocodiles are source of food to some people.
3. Reptiles attract tourists to the country who are source of government income.
4. Some reptiles like snakes are source of serum (anti venom) which is used to treat snake bites.
5. Reptiles control insect pests and vectors by feeding on them.

Activity:

1. Give one way you would identify a poisonous snake.
2. Why are crocodiles said to be carnivorous?
3. What makes the person bitten by the snake die if not attended to?
4. What is anti venom?
5. The snake doesn't have ears, how is it able to detect sound?
6. How does a chameleon get its prey?
7. In which way does a constrictor snake kill its prey?
8. How is a puff adder differ from all other snakes?
9. Why are snakes said to be defensive but not offensive?
10. How are snakes different from all other reptiles?
11. State the importance of each of the following to the poisonous snake:
    i) forked tongue
    ii) Hollow fangs

AMPHIBIANS

Amphibians are cold blooded vertebrates which move by leaping.

Amphibians are said to be double life vertebrates because they spend the first life in water when they are young and come on land when they are adult.

- Young Amphibians respires by means of gills
- A young amphibian is called a tadpole

Therefore, a tadpole will die shortly after being removed from water because it will lack oxygen as it can only use gills to trap dissolved oxygen found in water

Examples of Amphibians

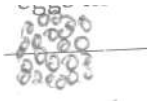
1. Toads
2. frogs
3. Newt
4. Salamander

Characteristics of amphibians

1. They are cold blooded
2. They reproduce by laying eggs which are soft shelled
3. They undergo external fertilization
4. Young amphibians respire by means of gills
5. The adult amphibians respire by using lung on land and moist skin in water
6. Amphibians have got 3 chambered hearts i.e 2 auricles and one ventricle
7. Amphibians spend their first life in water and during the adult stage they come on land

Differences between frogs and toads.

Toads	**Frogs**
1. They have short hind legs	1. They have long hind legs
2. They have no teeth in the upper jaw	2. They have teeth in the upper jaw
3. They mainly feed on insects	3. They mainly feed on vegetation
4. Their tadpoles are black	4. Their tadpoles are brown
5. They have dry rough skins	5. They have smoothly slippery skins
6. They mainly respire by means of lungs	6. They mainly respire by means of moist skin
7. They mainly live on land	

8. They have poison gland 9. They are more active at night (nocturnal) 10. They lay eggs in a double ribbon called a spawn	7. They mainly live in water 8. They don't have poison glands 9. They are more active during day time (diurnals) 10. They lay eggs in a mass form or lump form 

NB: The eggs of the amphibians are covered with jelly like or liquid substance which has got un pleasant smell to:-

i) Protect the eggs against predators

ii) To prevent the eggs from drying up which can prevent them from hatching.

Nocturnal animals are which are more active at night and inactive during day time.

Examples of nocturnal are;

Toads, Bats etc

Diurnals: Are animals which are more active during day time and inactive at night.

e.g frogs, man

Adaptations of the frogs to living in water

1. Frogs have got fully webbed feet for swimming
2. Frogs can use the moist skin to breathe in water
3. Frogs have got the streamlined body shape to reduce viscosity friction during swimming

NB: Frogs are able to live both on land and in water because they can use the moist skin to breathe in water and also lungs to breathe on land.

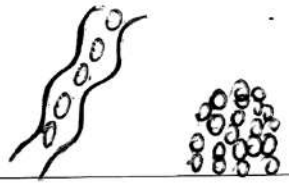
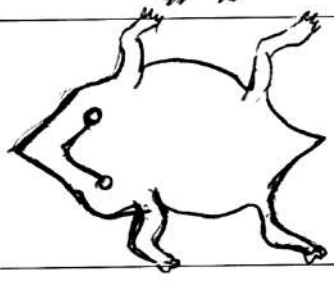
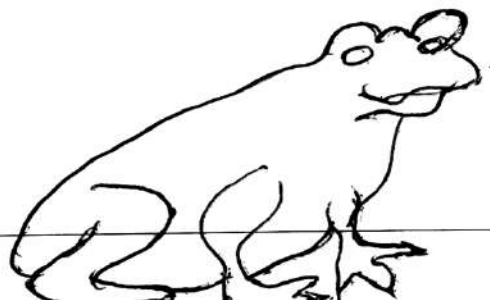
Respiration in amphibians

- ✓ The young amphibians (tadpoles) respires by means of gills.
- ✓ The adult amphibians by means of lungs on land and moist skin when they are in water

Reproduction in amphibians

- ✓ Amphibians reproduce by laying eggs
- ✓ During mating time, the male amphibians and the female one gather together in a pond or a stream then the male frog clings on top of a female frog. Then the female frog lays the eggs as the male frog sheds sperms on them and eggs become fertilized externally.
- ✓ In 1-3 days the eggs hatch into tadpoles and they start to use external gills to breathe.
- ✓ In 2 months the tadpole develop limbs

Stages of development in amphibians.

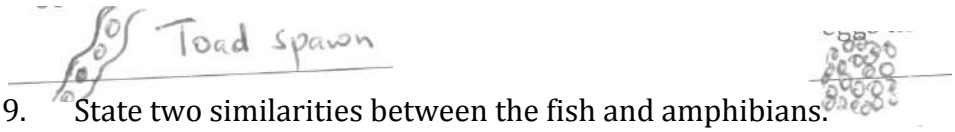
	Eggs
	External gills stage (1 – 4 days)
	Internal gills stage (8 days)
	Hind legs develop in 9 days onwards.
	• Tail shrinks develop • Fore limbs develop.
	Tail shrinks ~~develop~~ disappears. in 10 weeks.
	Adult frog.

Advantages of amphibians

1. Some amphibians are source of food to man
2. Some amphibian eat some insect vectors that help to control the spread of some diseases

Activity

1. Why are amphibians said to be double life vertebrates?
2. How are tadpoles similar to fish in terms of respiration?
3. In which way does a young amphibian respire?
4. Apart from frogs and toads, state any other two examples of amphibians.
5. Why are frogs able to live both on land and in water?
6. Point out two physical differences between frogs and toads.
7. Which type of fertilization do amphibians undergo?
8. Which amphibian lays the eggs below?



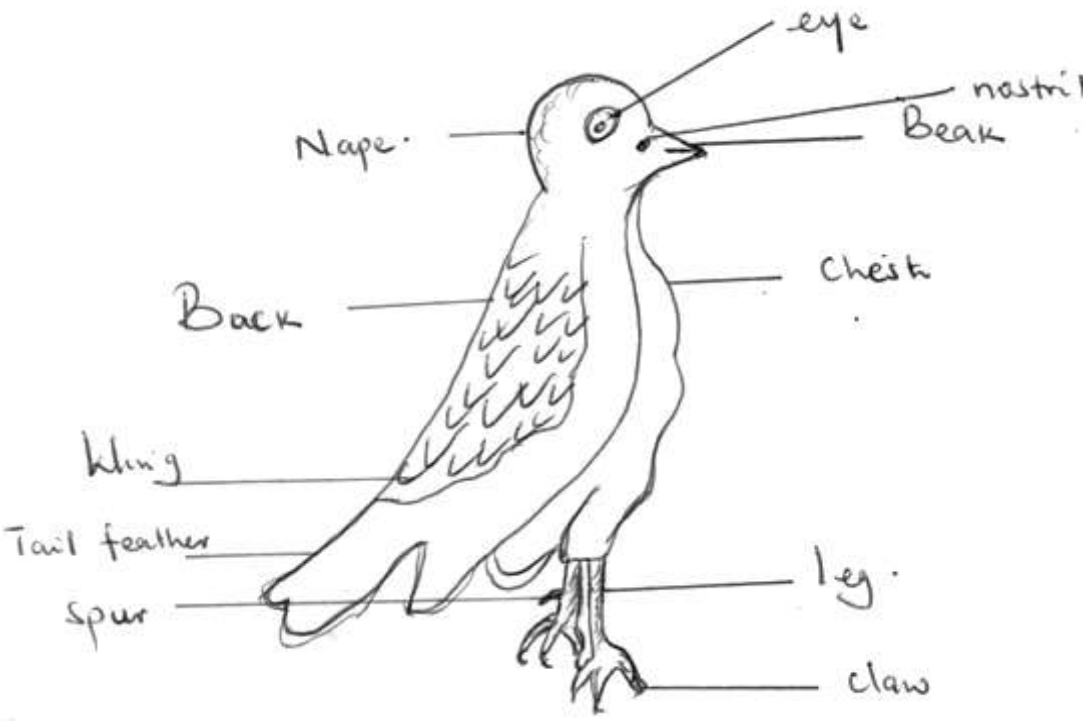
9. State two similarities between the fish and amphibians.
10. Identify two differences between the fish and amphibians.
11. Why does the tadpole die shortly after being removed from water?
12. State the importance of the jelly like substance found on the eggs of the amphibians.
13. Why are frogs said to be diurnals?
14. What are nocturnal animals?
15. How does an adult amphibian respire?

BIRDS

1. They are warm blooded animals (Homoeothermic)
2. They reproduce by laying eggs (oviparous) but these eggs are hard shelled
3. They undergo internal fertilization
4. They have a 4 chambered heart i.e two auricles and two 2 ventricles
5. They take care of their young ones

6. Birds bodies are streamlined to reduce viscosity friction
7. Birds respire by means of lungs
8. Birds have got 4 limbs but their fore limbs are modified into wings for flying.
9. Birds don't have teeth but have got horny beaks with nostrils
10. Birds have ear lobes covered with short feathers
11. Birds have got 3 eyelids i.e the lower and upper eye lid and the nictitating membrane to protect the birds eyes against strong blow of wind during flight
12. Birds bodies are covered with feathers
13. Their legs are covered with scales.

EXTERNAL PARTS OF THE BIRDb



Functions or uses of some parts of a bird

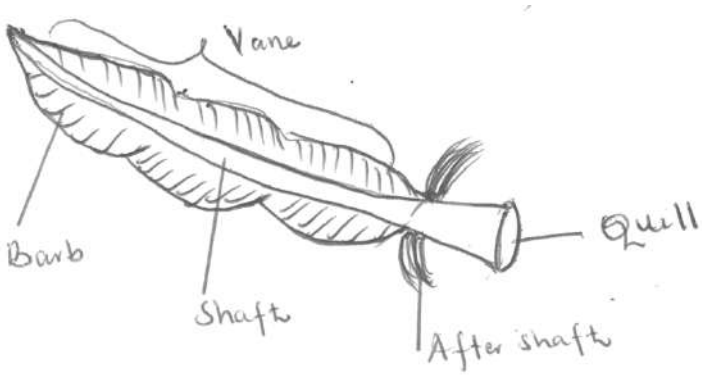
1. **Wings**: They are used by birds for flying.
2. **Spur**: It is used for protection by a bird.
3. **Nostril**: It is used for breathing.
4. **Beak**: It is used by the bird to pick food and also protection
   - It also enable broody hen to change eggs during incubation of eggs
5. **Claws**: They enable the birds to scratch the ground for getting food to eat.
   - They are used by the birds to grip or hold food or their prey
   - They are also used for protection

TYPES OF FEATHERS

1. Quill feather (flight feather)
2. Covert feather (Body feather)
3. Down feather
4. Hair feather (Filoplume feather)

QUILL FEATHERS

- They are the biggest feathers on the bird's body
- They are found on wings and tails
- They enable birds to fly and that is why they are called flight feather



COVERT FEATHERS (BODY FEATHERS)

- They cover almost the whole body of a bird
- They are of the same size
- They give warmth to birds and provide streamlining shape for easy flying



DOWN FEATHERS

- These are feathers the chicks are hatched with.
- They provide warmth to the birds and control heat loss.



HAIR FEATHERS (FILOPLUME)

These are hairy feathers and they are found nearest to the skin of the bird.



FUNCTIONS OF FEATHERS TO BIRDS

1. They enable birds to fly
2. They give birds shape and colour for easy identification
3. They provide warmth to the birds' body on cold days
4. They cover and protect the birds' body against injuries
5. They are used by a broody hen to provide warmth to the chicks and protection.

Activity:

1. Why are birds said to be homoeothermic?
2. How do birds reproduce?
3. Why are quill feathers called fight feathers?
4. State two characteristics which are common to both birds and reptiles.
5. Why are some birds un able to fly?
6. State the importance of the birds' body being streamlined during flying.
7. In which way is the function of nostril to the birds differ from that of the fish?
8. List one example of a flightless bird.
9. How are birds different from amphibians?
10. State the importance of the spur to an eagle.
11. How are eggs laid by birds different from those of amphibians?
12. Why are birds said to be oviparous?
13. Which type of fertilization occurs in birds?
14. Point out two reasons why birds are able to fly.
15. How do birds respire?

ADAPTATIONS OF THE BIRDS TO FLYING

1. Birds have got hollow bones which help to reproduce their weight during flight.
2. Birds have got streamlined bodies which help to reduce viscosity friction during flight.
3. The birds fore limbs are modified into wings for flying.

4. Birds have got wings for flapping air during flight.
5. The birds' eyes are protected against strong blowing wind by a tough membrane called nictitating membrane.
6. Birds have got strong breast muscles which enable them easily flap their wings.
7. Birds have no pinna to obstruct the flow of wind during flight.
8. Birds have got small heads and long necks which make them easily turn quickly.
9. Birds' bodies are covered with flight feathers which are bad conductors of heat and keeps them warm on cold days when flying.
10. Birds have got hollow air sac starting from the lungs which makes respiration effective during flight.

GROUPS OF BIRDS

Birds are grouped into 8 categories depending on their feeding habits and characteristics.

1. Perching birds
2. Swimming birds
3. Wadding birds
4. Climbing birds
5. Birds of prey (carnivorous birds)
6. Scratching birds
7. Scavenger birds
8. Flightless birds

PERCHING BIRDS

These are birds which have got three toes pointing forward and one toe pointing backward.

They use those toes for perching on tree branches.

Perching birds are grouped into 4 classes namely;

1. Insect eating birds
2. Nectar sucking birds
3. Seed eating birds
4. Fruit eating birds

SEED EATERS:

They have short conical beaks for picking fruits.

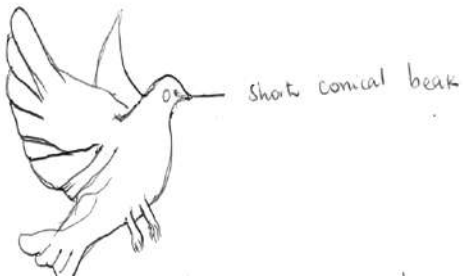
Examples of seed eating birds

1. Pigeons
2. Doves
3. Weaver birds

4. Finches

Seed eating birds help in seed dispersal

Dove



Insect eating birds

These are birds with short narrow beaks for picking insects from the ground.

Examples of insect eating birds.

1. Sparrows
2. Robin
3. Swallows
4. Bee eaters
5. Swifts

Cuckoo

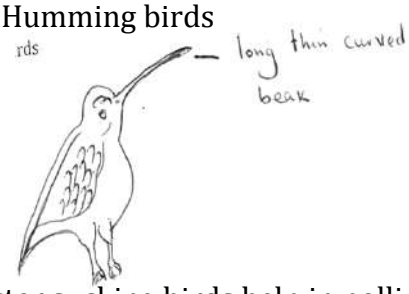


Nectar sucking birds

These are birds with long slender curved beaks for sucking nectar from flowers.

Examples of nectar sucking birds

1. Sun birds
2. Humming birds



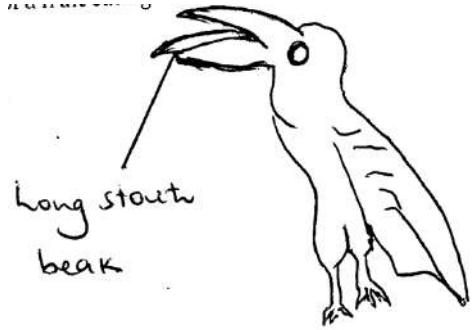
Nectar sucking birds help in pollination of flowers.

Fruit eating birds

These are birds with long stout beaks for picking fruits from trees.

An example of a fruit eating bird is a Horn bill.

An horn bill



Fruit eating birds are harmful because they are pests but they are also useful because they help in seed dispersal.

BIRDS OF PREY (FLESH EATING BIRDS)

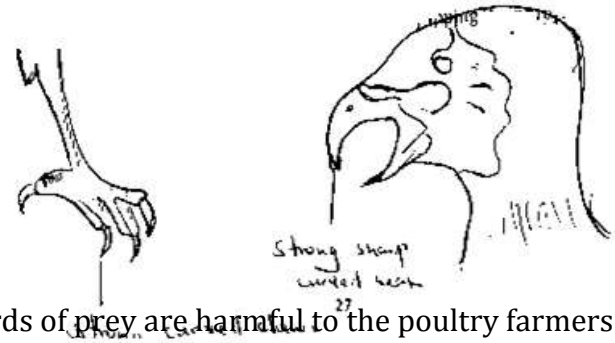
These are birds which hunt and kill their prey.

Examples of birds of prey

1. Eagles
2. Kites
3. Hawks
4. Secretary birds
5. Falcons
6. Owls

Characteristics or adaptations of birds of prey to their mode of feeding.

1. They have got a strong harp curved beak for tearing flesh of their prey.
2. They have a good eye sight for spotting their prey from a distance.
3. They have got the strong curved claws for holding or gripping their prey.



NB: Birds of prey are harmful to the poultry farmers because they are predators to farmers'

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poultry.

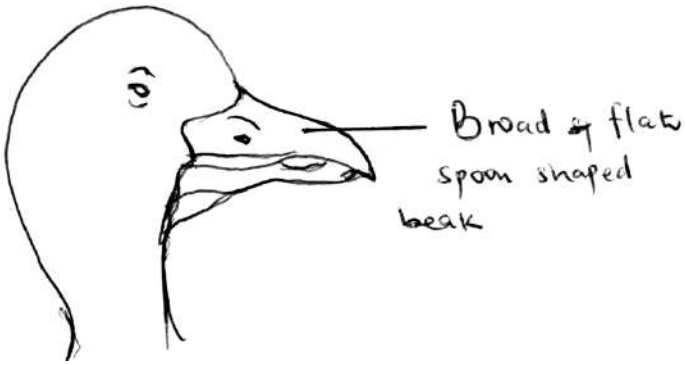
SWIMMING BIRDS

- These are birds with fully webbed feet for flapping on water and floating on water during swimming.
- They have broad flat spoon shaped beaks for spearing fish in water.
- They feed on worms, snails, fish and other insects found in mud.

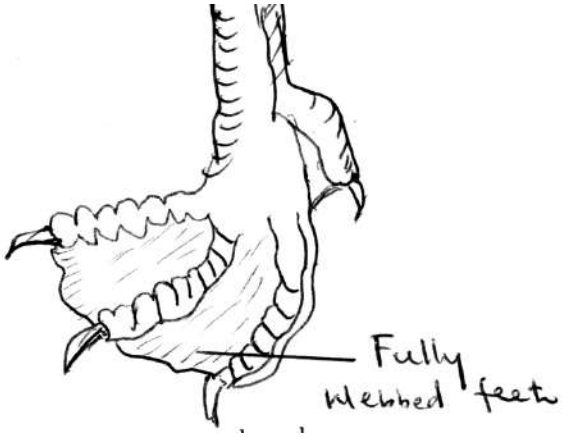
Examples of swimming birds.

1. Ducks
2. Geese
3. Swans
4. Seagulls
5. Pelicans
6. Cormorants
7. King fishers

Beak for a duck



Foot of a duck



WADING BIRDS

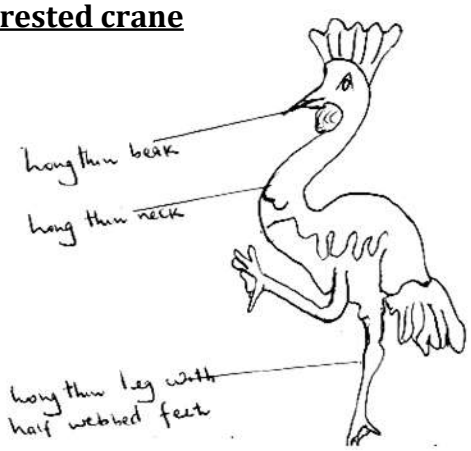
- These are birds which live alongside water bodies.
- They have long thin beaks for catching fish, frogs and worms from water and mud.
- They have long thin legs with half webbed feet to enable them walk in mud and swallow water without sinking.

Examples of wading birds

1. Heron
2. Crested crane
3. California condors
4. Flamingo
5. Ibis

6. Snipe

Crested crane

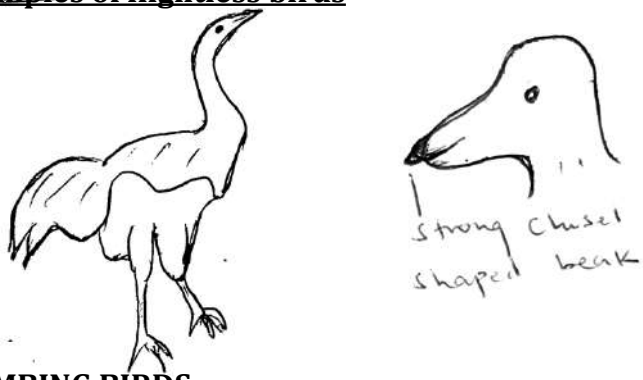


FLIGHTLESS BIRDS

These are birds which are un able to fly but they move very fast on the ground.

- They have bone marrows which make their bodies heavy.
- They have weak and small wings compared to their body sizes.
- An ostrich is the biggest and fastest bird on earth.

Examples of flightless birds



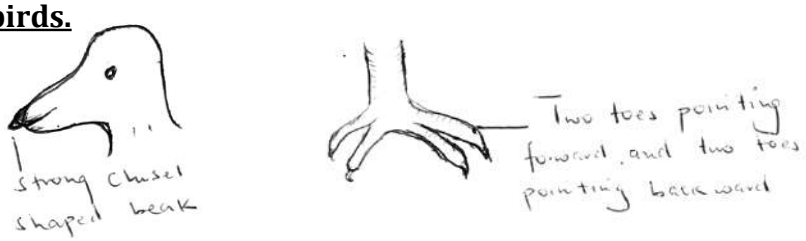
CLIMBING BIRDS

- These are birds with ability of climbing birds.
- They have strong chisel shaped beak for digging holes in trees.
- They have two toes pointing forward and two toes pointing backward.
- They mainly eat insects in trees.

Examples of climbing birds.

1. Wood peckers
2. Parrots

SCRATCHING BIRDS



These are birds with strong blunt stout claws for scratching the ground to find food.

- They have short pointed beaks
- They feed on grains and insects

Examples of scratching birds

1. Chicken
2. Turkey
3. Guinea fowl
4. Crested francolin

SCAVENGER BIRDS

- These are birds which feed on leftover meat of dead animals.
- They have strong sharp curved beaks for tearing flesh of their prey.

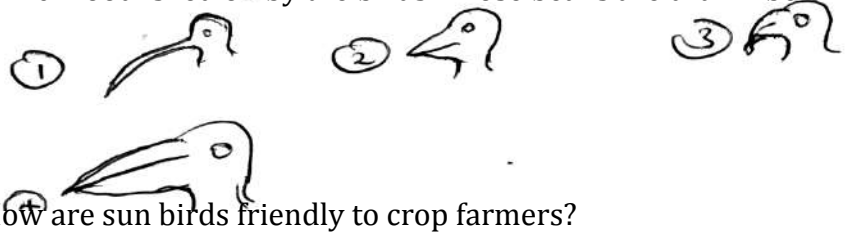
NB: The scavenger birds help to clean up the environment by eating the leftover meat of dead animals from the environment which would smell and attract houseflies.

Examples of Scavenger birds

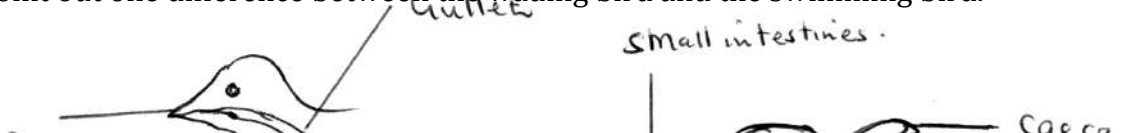
1. Vultures
2. Crows
3. Marabou storks

Activity:

1. Which food is fed on by the birds whose beaks are drawn below?



2. How are sun birds friendly to crop farmers?
3. In which way is a fruit eating bird important to man?
4. How is an eagle adapted to its mode of feeding?
5. Why is an ostrich un able to fly?
6. State one characteristic of swimming birds.
7. Which bird is both a scavenger and a bird of prey?
8. How are crows, marabou storks, ventures friendly to the environment?
9. In which way are webbed toes useful to a duck?
10. How is a sun bird adapted to its mode of feeding?
11. State the role of the strong sharp curved beak to birds' of prey.
12. State one difference between the perching birds and the climbing bird.
13. Point out one difference between the wading bird and the swimming bird.



ALIMENTARY CANAL OF A BIRD

Functions of each part

Beak: It is used by the bird for picking food.

Gullet: It passes food to the crop.

Crop: It moistens, softens and stores food before it is sent to the stomach.

Stomach: It is where food is mixed with digestive juices.

Gizzard: It contains the grits or parables which help to crush down food into small particles.

NB: Grits (parables) are small stones found in birds' gizzard which breakdown food into small particles.

Small intestines: It is where digested food is absorbed in the body of the bird.

Large intestines: It is where water absorption is done.

Caeca: It is where un digested food is stored in form of droppings before it is passed out.

Cloaca/ vent: It passes out un digested food in form of droppings.

- It is also the passage of eggs during the laying process.

REPRODUCTION IN BIRDS

Birds follow the following steps during reproduction.

1. Courtship and pairing
2. Nest building
3. Mating and egg laying
4. Care for eggs
5. Care for the young ones

Courtship and pairing

It is when the birds select each other for the task of reproduction.

Nest building

This is done by parental birds in preparation for laying eggs.

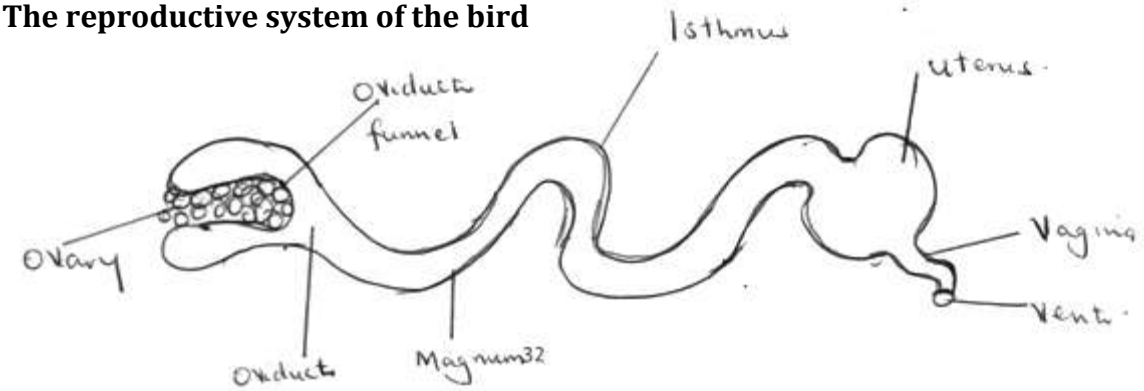
Mating and laying

This is done when the male birds mounts on top of the female bird and deposits sperms in the vent to enable internal fertilization to take place.

Care for eggs

In most cases incubation is done by only female birds through some birds like doves, incubation is done by both the male and female birds.

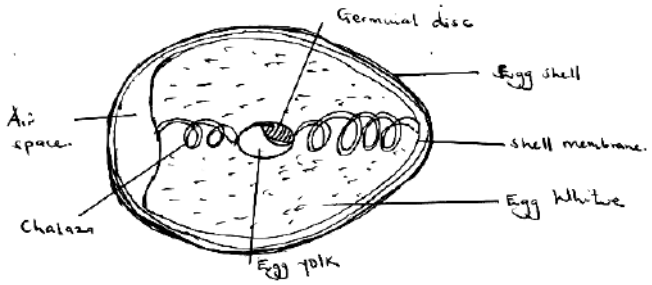
The reproductive system of the bird



FUNCTIONS OF EACH PART

1. **Ovary:** It stores and produces the mature ova.
2. **Ova:** They are the female reproductive cells.
3. **Oviduct funnel:** It receives and directs the ova to the oviduct.
4. **Oviduct:** It is where fertilization occurs.
5. **Magnum:** It is where the egg white is added to the fertilized egg.
6. **Isthmus**: It is where mineral salts and shell membrane is added to the fertilized egg.
7. **Uterus:** It is where the egg shell is added to an egg.
8. **Vagina:** It is where an egg is given colour i.e white, brown or spotted.
9. **Cloaca/vent:** It acts as the passage of an egg during the laying process.

PARTS OF AN EGG



FUNCTIONS OF EACH PART.

1. **Egg shell**: It protects the inside parts of an egg from damage.

   NB: The egg shell is porous or permeable to allow easy exchange of gases inside an egg.
2. **Shell membrane**: It protects the egg content from bacteria which may destroy it.

3. **Albumen** (Egg white): It is a source of water and mineral salts for the developing embryo.
4. **Egg yolk**: It is a source of food in form of proteins and fats for the developing embryo.
5. **Germinal disc**: It develops into a chick after fertilization.
6. **Chalaza**: - It holds the yolk and the embryo in one position.
   - It also transports fresh air from the air space to the embryo
7. **Air space**: It stores fresh air for the developing embryo.

USES OF BIRDS TO MAN

- Some birds help to carryout pollination like sun birds.
- Some birds help to carryout seed dispersal like eating birds.
- Some birds are source of food to man in form of eggs and meat.
- Birds' bones are used to make glue.
- Birds are source of feathers which are used for decoration and costumes for cultural dances.
- Some birds like scavenger birds help to clean up the environment by eating up the leftover meat of dead animals.
- Some birds like poultry are source of income to farmers.
- Birds are used for customary purpose like paying bride price.
- Some birds are used as pets at home.

DANGERS OF BIRDS TO MAN

- Some birds are pests to farmers' crops.
- Some birds keep vectors like mites.
- Some birds cause accidents on run ways of aeroplanes.
- Some birds are birds of prey and predators to poultry.
- Some birds cause sound pollution by causing or making a lot of noise like weaver birds.
- Some birds make the environment dirty with their droppings.

Activity:

1. Which type of digestion occurs in the birds' gizzard?
2. Mention three things which happen to the food in the crop of the birds' alimentary canal.
3. Which type of birds are commonly seen near abattoirs?
4. Apart from protection, state any other function of the beak to a bird.
5. Why do poultry farmers include small stones in the poultry mash?
6. State the role of grits in the birds' gizzard.
7. Why is the egg shell being porous useful to the developing embryo?
8. Which reason do poultry farmers give for including calcium in the layer's mash?

9. Name the part of an egg which develops into the chick after fertilization and incubation.
10. Apart from holding the egg yolk and embryo in one position, state any other function of the chalaza to the embryo of an egg,
11. Why are eggs important to the child's diet?
12. In which way can some birds be able to control the spread of diarhoeal diseases in the community?
13. Apart from being pests, how else are weaver birds harmful in the environment?
14. What is incubation?
15. State two factors that can hinder incubation to take place.
16. What is incubation period?

MAMMALS

Mammals are warm blooded vertebrates with mammary glands.

Most mammals give birth to their live young ones part from the egg laying mammals i.e the duck billed platypus and spiny ant eater

Examples of mammals

1. Man
2. Bat
3. Goat
4. Dog
5. Cat
10. Sheep
11. Lion
12. Leopard
13. Squirrels
14. Duck billed platypus

Characteristics of mammals

1. They have mammary glands i.e they feed their youngones on breast milk produced by the mammary glands.
2. They have well developed pinna (ear lobes)
3. They undergo internal fertilization
4. They respire by means of lungs
5. They are warm blooded (homoeothermic)
6. Their bodies are covered with fur or hair
7. They have a 4 chambered heart i.e two auricles and two ventricles
8. They have 4 limbs
9. They have the large brain protected by the skull (cranium)
10. They take care for their young ones i.e providing them with food and protection

GROUPS OR CLASSES OF MAMMALS

1. Primates (most advanced mammals)
2. Hoofed mammals (Ungulates)
3. Sea mammals (Cetaceans)
4. Egg laying mammals (Monotremes)
5. Pouched mammals (Marsupial mammals)
6. Rodents (Gnawing mammals)
7. Flying mammals (Chiroptera)
8. Insect eating mammals (Insectivorous mammals)

PRIMATES (Most advanced mammals)

These are mammals with well-developed brain.

Examples of primate mammals

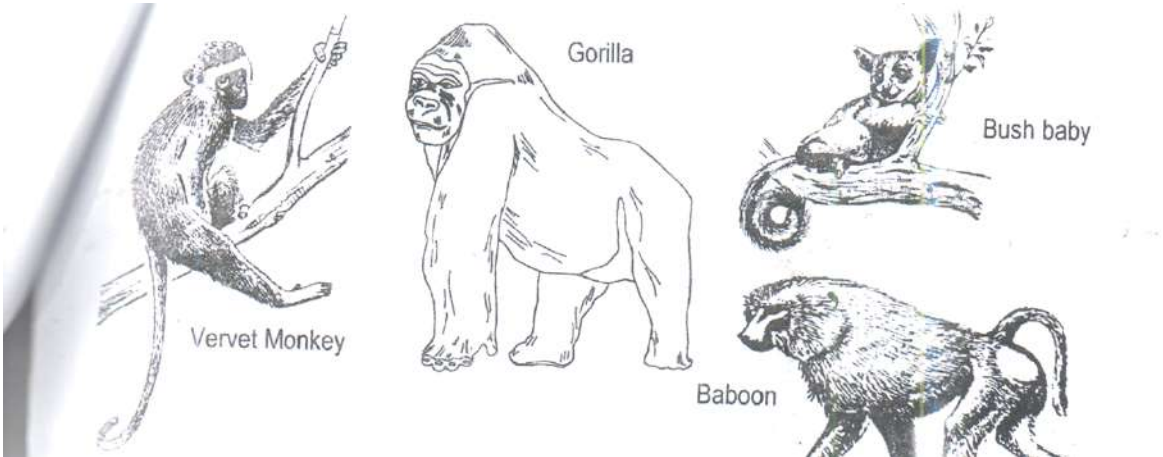
1. Man	- Orangutan
2. Monkey	- Chimpanzees
3. Apes	- Baboons
4. Bush babies	- Gorillas

Characteristics of primate mammals

1. They have well developed brains
2. They use their fore limbs for holding and two hind limbs for walking.
3. They have five fingers on each hand and five toes on each leg.
4. They have 4 different types of teeth i.e.
    - Incisors for cutting and biting food
    - Canines for tearing flesh
    - Molars and premolars for grinding, chewing and crushing down food.
5. All primates are omnivorous

NB: Omnivorous animals are animals which feed on both flesh and plant matter (vegetation)

A Monkey



Ungulates (hoofed mammals)

- These are mammals with hooves on their toes.
- They are mainly herbivorous animals.

Herbivorous animals: These are animals with mainly or entirely feed on vegetation or plant matter.

Groups of ungulates

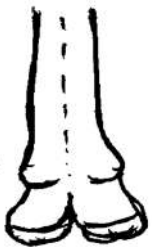
1. Even toed ungulates
2. Odd toed ungulates

Even toed ungulates: These are ungulates with even number of hooves on their feet i.e 2 or 4 hooves.

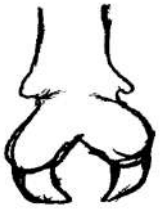
Examples of even toed ungulates.

1. Cows - Okapi
2. Sheep - Antelopes
3. Hippopotamus - Giraffe
4. Goat - Camel
5. Pigs

Camel



Cow



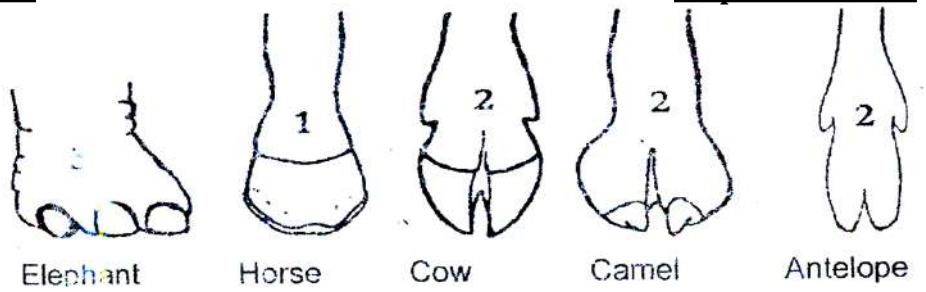
Odd toed ungulates

These are ungulates with odd number of hooves in their feet. i.e 1 or 3 hooves.

Examples of odd toed ungulates

- Zebra
- Elephant
- Rhino
- Horse
- Donkeys

Horse **Elephant hooves**



Some ungulates are ruminants and others are non-ruminants.

Ruminant animals: Are animals which chew cud.

Cud: This is the food which is sent back in the mouth of the ruminant animals for re-chewing.

Examples of ruminant animals

- Cows
- Giraffe
- Goat
- Camel

NB: Ruminant animals have got four stomach chambers i.e Rumen, Recticulum, Omasmus and Abomasum

Non ruminant animals: These are animals which don't chew cud.

Examples of non- ruminant animals

1. Pig
2. Warthog
3.

CARNIVOROUS MAMMALS (FLESH EATING MAMMALS)

Carnivorous mammals are mammals which feed mainly on flesh.

A predator animal is an animal which hunts and kills its prey.

A prey is animal which is hunted and fed on by a predator.

Examples of carnivorous mammals

1. Dogs
2. Lions
3. Tiger
4. Cheetah
5. Leopard
6. Fox
7. Jaguar
8. Hyena

Characteristics of carnivorous animals.

1. They have very good speed (They are very fast)
2. They have well developed canine teeth for tearing flesh of their prey.
3. They have very good sense of smell or snout to enable them trace the ways of their prey.
4. They have well developed strong curved claws or talons for killing and holding their prey.
5. They have soft pads in the feet which enable them run after their prey without making noise.
6. They have a very good sense of hearing
7. They have a very good sense of sight for spotting their prey from a distance.

GROUPS OF CARNIVOROUS MAMMALS

1. Dog family carnivores
2. Cat family carnivores

Dog family carnivores: Are those carnivores whose body formation looks like that of a dog.

Examples of dog family carnivores.

1. Domestic dog
2. Fox
3. Hyena
4. Woves
5. Jackal

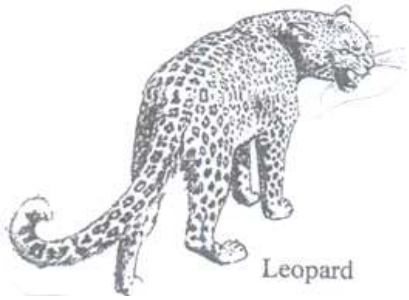


Cat family carnivores

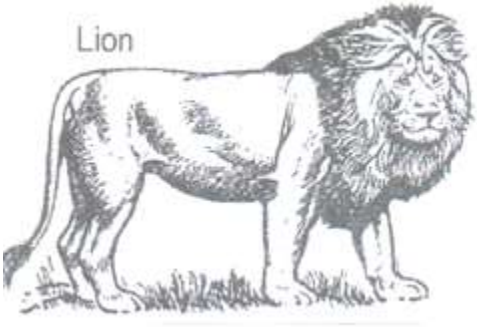
Ate carnivores whose body formation looks like that of cat.

Examples of cat family carnivores

- Leopard
- Lion
- Cheetah
- Jaguars
- Tigers



A cat family carnivore



A dog family carnivore



Activity:

1. State two unique characteristics of mammals which make them different from all other mammals.
2. Why is a monkey said to be a primate mammal?
3. Define each of the following terms.
   a) Homoeothermic animals
   b) Poikilothermic animals
   c) Viviparous animals
   d) Omnivores
   e) Carnivores
   f) Herbivores
4. How do mammals respire?
5. In which way is a lion adapted to its mode of feeding?
6. State two similarities between birds and mammals.
7. Which type of fertilization do mammals undergo?
8. In the space below, draw the hoof for each of the following animals.
   i) An elephant ii) cow
9. How useful are canine teeth to dogs?
10. State the importance of incisor teeth to a cow.
11. How useful are soft pads in the feet of a carnivorous mammal?
12. State one way mammals care after their young ones.
13. State the importance of mammary glands to mammals.

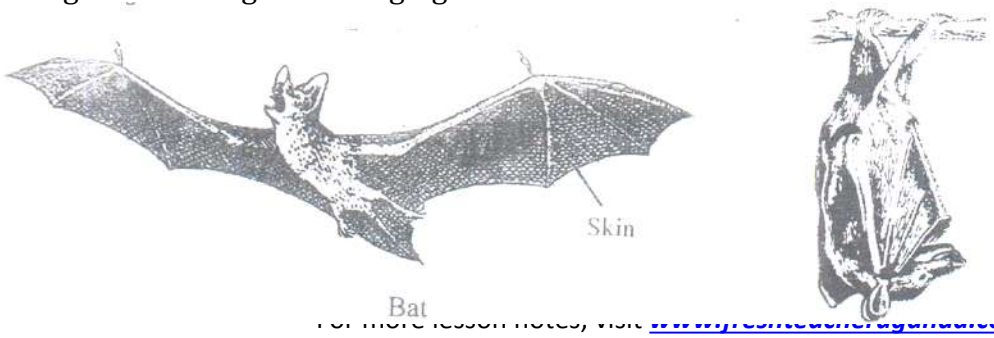
CHIROPTERA (FLYING MAMMALS)

These are mammals whose fore limbs are modifies into wings for flying.

Examples of flying mammals.

1. Bat
2. Koluga

A diagram showing a bat hanging on a tree branch.



For more lesson notes, visit www.ijcsteacher.ug.edu.com

A bat sleeping hanging upside down.

Types of bats

1. Insect eating bats
2. Fruit eating bats
3. Blood sucking bats (Vampire bats)

Insect eating bats: Are bats which feed on insects like ants, mosquitoes, mites, grasshoppers, locusts

NB: They are good because they control insect vectors and insect pests by feeding on them.

Fruit eating bats: Are bats which feed on fruits like berries, guavas, mangoes, tomatoes, pawpaws, grapes.

NB: The fruit eating bats are dangerous because they are pests to farmers' crops but they are also good because they help in seed dispersal.

Blood sucking bats (vampire bats): Are bats which suck blood from animal bodies like horses, camels, cows and buffalos.

Bats are nocturnal animals but they are more active at night and during day time.

A bat uses the echoes in order to locate food and dodge obstacles during flight night.

Insectivorous mammals

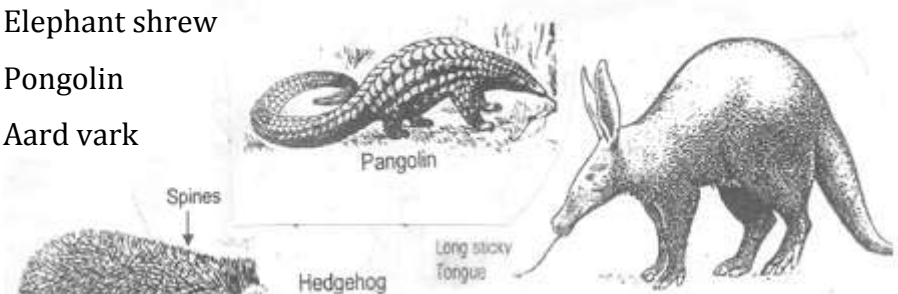
These are mammals which feed on insects.

Characteristics of insectivorous mammals

1. They have a sensitive snout or a good sense of smell.
2. They have got the strong claws for digging the ground to get insects
3. They have good speed
4. They mostly hunt at night and sleep during day time (they are nocturnal)
5. Most of them are toothless (endetanta) e.g pangolin
6. Most insectivorous mammals have got sharp pointed scales on their back called spines for protection e.g. Hedge hog

Examples of insectivorous mammals

1. Hedge hog
2. Elephant shrew
3. Pongolin
4. Aard vark



Aard vark

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RODENT (GNAWING MAMMALS)

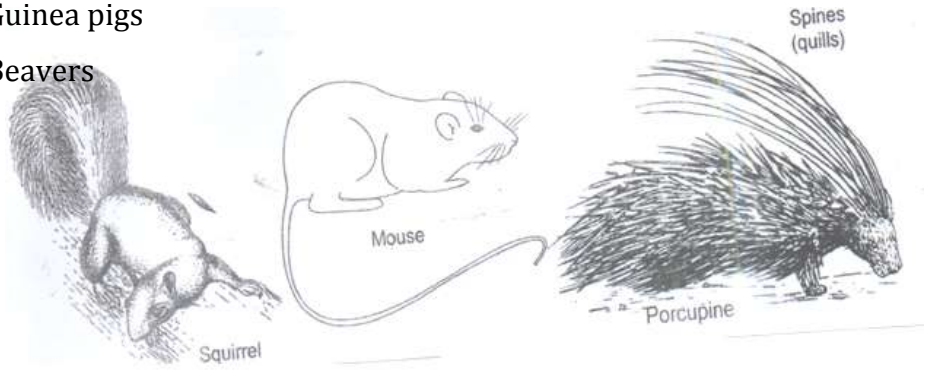
Gnawing mammals are mammals with well-developed incisor teeth for chewing rapidly and powerfully.

Characteristics of gnawing mammals.

1. They have well developed incisor teeth for chewing rapidly and powerfully.
2. They are vegetarians (They mainly gnaw on tuber crops)
3. They have well developed claws for digging holes in the ground to make their hanitats and find food.

Examples of Rodents

1. Squirrels
2. Hares
3. Rats
4. Porcupines
5. Mice
6. Guinea pigs
7. Beavers



Most gnawing mammals are very harmful to the crop farmers because they are crop pests.

POUCHED MAMMALS (MARSUPIALS)

These are mammals with pouches or pockets on their abdomens for carrying their young ones.

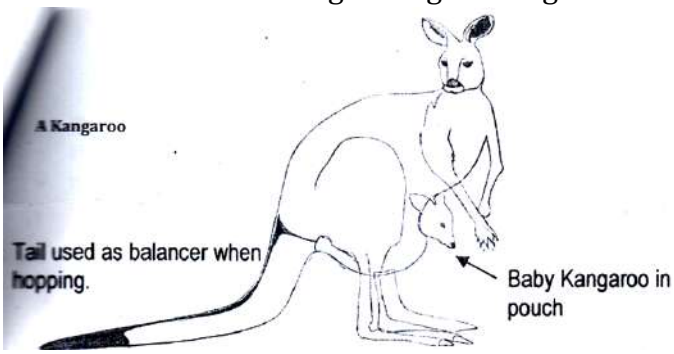
Young ones are carried in pouches by mothers until they are fully developed.

Pouches contains mammary glands where young ones suck the breast milk.

Examples of pouched mammals

1. Kangaroo
2. Koala bears
3. Wambat
4. Long nose band coat
5. Opossum

A kangaroo uses the tail for balancing during running



Monotremes (Egg laying mammals)

- These are mammals which reproduce by laying eggs.
- They are called primitive mammals because they reproduce by laying eggs.
- They are also called oviparous mammals.
  Oviparous animals are animals which reproduce
- They are said to be mammals because they feed their young ones on the breast milk produced by mammary glands.
- They use beaks for feeding.

Examples of egg laying mammals

1. Duck billed platypus
2. Spiny out eaters

   <u>A duck billed platypus</u>


Duck-billed Platypus


Spiny Anteater

<u>CETACEAN (SEA MAMMALS)</u>

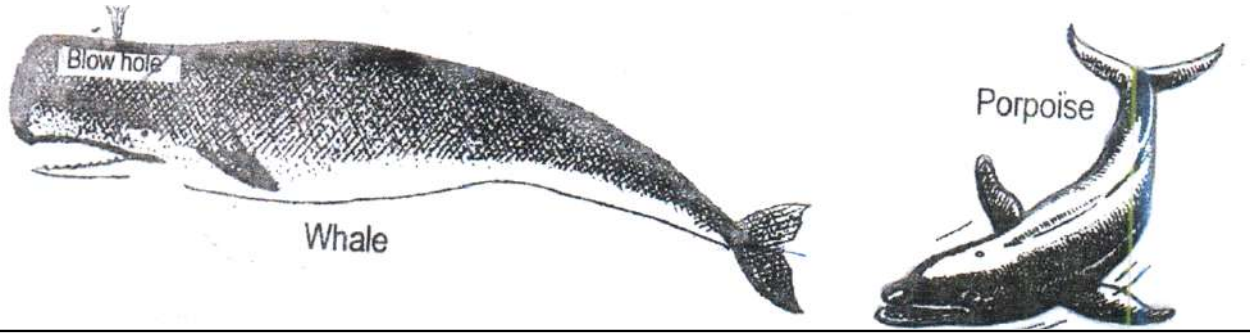
- These are mammals which live in very big water bodies likes seas and oceans
- They are aquatic animals because they live in water

- They have internal pinna
- They do not have hair on their bodies
- Their fore limbs are modified into flippers for swimming.
- They have got a flat layer inside their skin called blubber which help to generate heat in their bodies to keep them warm.
- They give birth to their live young ones and feed them on the milk produced by the mammary glands

Examples of sea mammals

1. Whales
2. Seals
3. Dolphins
4. Dugongs
5. Porpoises

- A whale is the largest mammal on earth.
- They are able to stay for a longer time in water after taking a long breathe.
- They respire by means of lungs.



Activity:

1. State one characteristic of ruminant animals.
2. Which type of teeth do ungulates lack?
3. Differentiate between the predator and a prey.
4. Bats are not birds, give the reason to support the statement.
5. How are bats different from all other mammals?
6. State the importance of echoes to the bats.
7. Why are bats said to be nocturnals?
8. In which way are fruit eating bats useful to man?
9. State the disadvantage of the fruit eating bats.

10. How do we call the reflected sound?
11. Why are bats able to fly?
12. Apart from a kangaroo, list only other examples of a pouched mammal.
13. Why is a duck billed platypus called a mammal when it lays eggs?
14. How useful is a pouch to a kangaroo?
15. State the unique difference between the monotremes and other mammals.
16. Of what importance is a blubber to a sea mammal?
17. Why is it wrong to say that a whale is a big fish?
18. How is a hedgehog similar to the porcupines in terms of protection?
19. How are rodents harmful to crop farmers?
20. State the similarity between the spiny ant eater and birds in terms of reproduction.

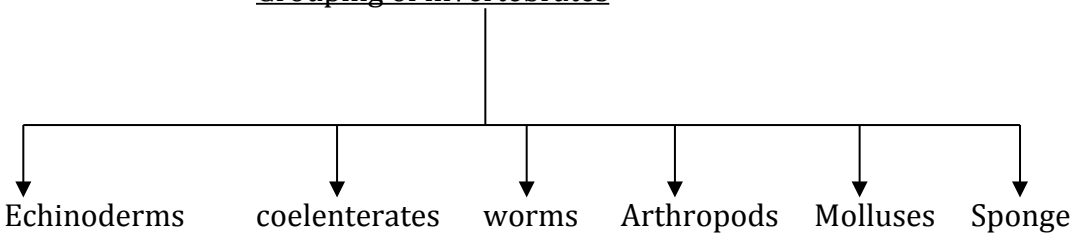
INVERTEBRATES

Invertebrates are animals without a back bone.

Examples of invertebrates.

1. Houseflies
2. Mosquitoes
3. Worms
4. Crabs
5. Jelly fish
6. Sea urchins
7. Butterflies
8. Snails
9. Oyster
10. Slugs

Grouping of invertebrates



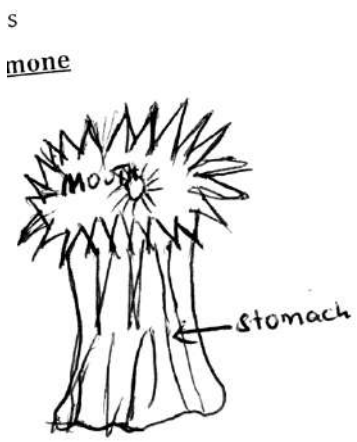
COELENTERATES

- They are stinging animals
- They have syndical bodies with two layers
- They have only one opening on their bodies which work as the mouth and anus.
- They live in seas and oceans.
- They reproduce by means of budding.

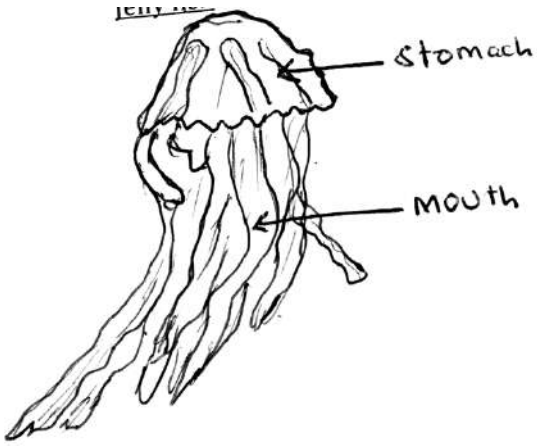
Examples of coelenterates

1. Hydra
2. Jelly fish
3. Sea anemones
4. Corals

Sea anemone



Jelly fish



MOLLUSCS

Molluscs are un segmented soft bodied invertebrates.

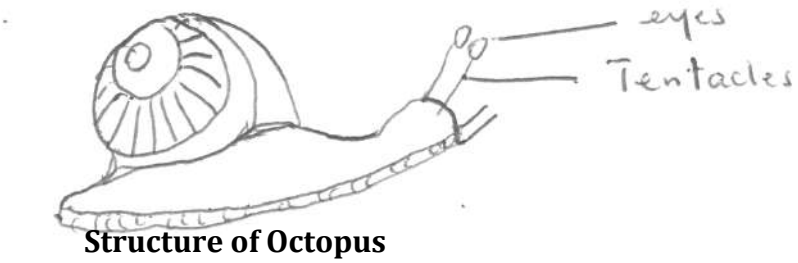
Examples of molluscs

1. Snails
2. Slugs
3. Oyster
4. Octopus
5. Cuttle fish
6. Squid

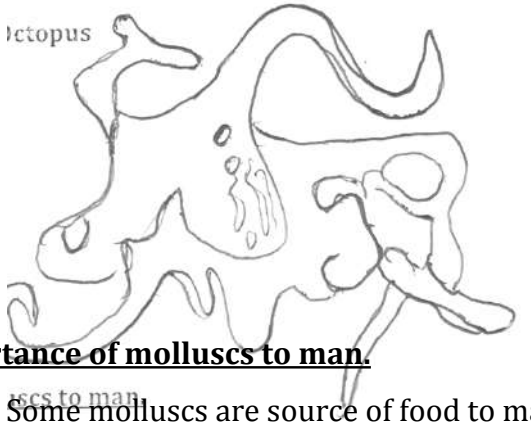
SNAILS

- These are garden snails and water snails
- Garden snails live on land while water snails live in water
- Water snails are vectors because they spread schistosoma worms that cause Bilharzia to man.
- Snails have got tentacles which they use as sense organs to touch, smelling and feeling.
- Snails have got shells where they always hide for protection against enemies
- Sea molluscs use gills for breathing
- Hard molluscs have special kind of lungs used for breathing.

Structure of a snail.



Structure of Octopus



Importance of molluscs to man.

1. Some molluscs are source of food to man
2. Their shells are used for decoration
3. Their shells are used to make animal feeds like poultry feeds

Dangers of molluscs

Molluscs like water snail spreads the schistosoma worms which cause bilharzia to man.

A person can get bilharzia through drinking un boiled water containing schistosoma worms.

Activity:

1. How are houseflies different from frogs?
2. In which way are molluscs harmful to the human health?
3. Give two examples of molluscs.
4. How can the spread of bilharzia be controlled at home?
5. Identify the protection mechanism for the snail.
6. What causes bilharzia?
7. State the role of tentacles to a snail.
8. Why does a snail die when oil is poured onto its skin?
9. State the main characteristic of invertebrates.
10. How do coentraterates protect themselves?
11. State the benefit poultry farmers can obtain from molluscs.
12. Why is bilharzia said to be a water borne disease?

ECHINODERMS

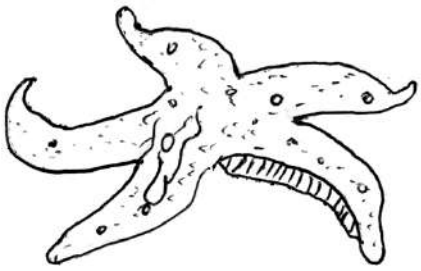
- They are sea invertebrates
- They have spiky skins
- They have un segmented bodies

Examples of echinoderms

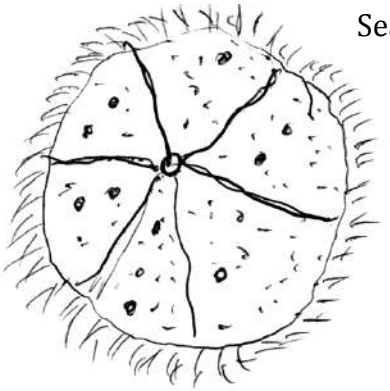
1. Star fish
2. Sea urchins
3. Sea cucumber
4. Sea lilies

Structure of some echinoderms

Star fish



Sea urchins



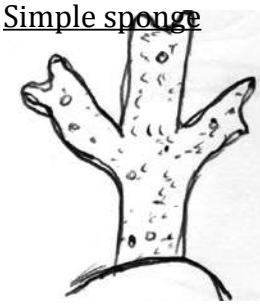
SPONGES (PORIFERA)

- They are sea invertebrates
- They look like plants but they are animals
- They live in colonies
- They do not always move about
- They always remain attached to the floor of the sea
- They have many holes on their bodies
- These holes are used for breathing and feeding
- Food and oxygen are absorbed from water as water flows over the holes

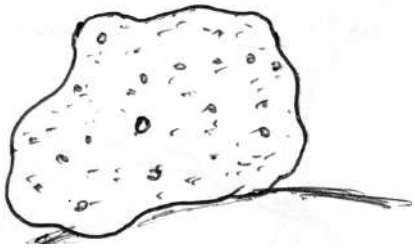
Examples of sponges

1. Simple sponge
2. Common bath sponge

Simple sponge



Common bath sponge



WORMS

- Worms are long thin and soft bodied invertebrates
- They breathe through their moist skins

Groups of worms

1. Segmented worms (Annelids)
2. Flat worms (platy-helminthes)
3. Round worms

SEGMENTED WORMS

- These are worms with body segments (rings)
- They live in water and soil

Examples of segmented worms

- Earth worms
- Leech
- Bristle worms

Hermaphrodites are animals with both male and female reproductive organs.

Other examples of hermaphrodites are;

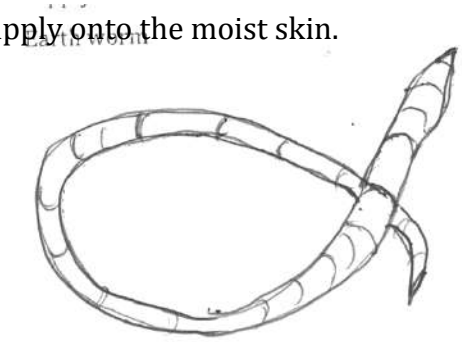
- Tape worms
- Snails

Importance of earth worms

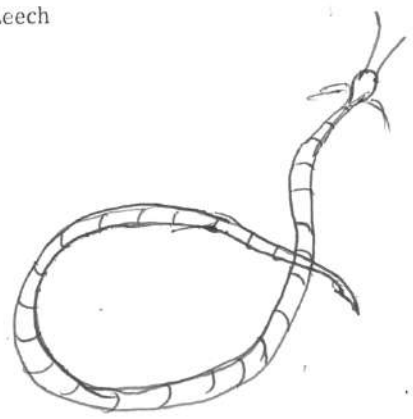
1. They help to aerate the soil
2. They decompose the organic matter to form humus

   Earth worms create the soil through making tunnels in the soil as they move through it.

- After heavy rain earth worms come out of the soil to get oxygen for breathing.
- Earth worms use the moist skin for breathing.
- Earth worms die when oil is poured on its skin because the oil will block the oxygen supply onto the moist skin.



Leech



Bristle worm



These are worms with flat and segmented bodies.

Examples of flat worms.

Tape worms

Liver flukes

TAPE WORMS

They are endo-parasites

A parasite is a living organism that depend on another organism for shelter and food without killing it but causing harm to them.

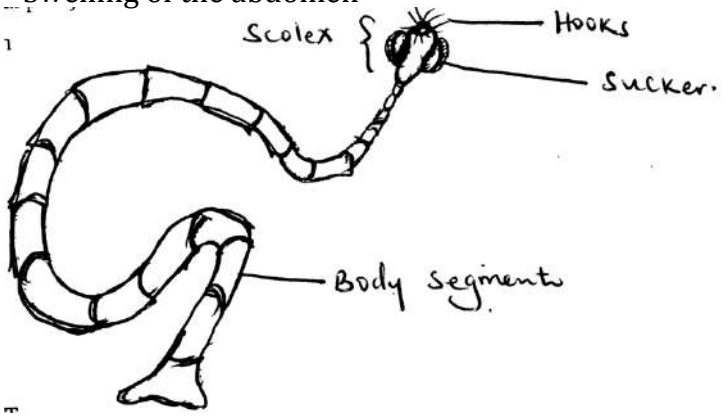
- Tape worms live in intestines (ileum)
- They feed on digested food in the ileum

How tapeworms enter the body

- Through eating under cooked eat from an infected animal.
- Through drinking un boiled water containing tape worm eggs.
- Through eating un washed raw contaminated green vegetables.
- Through eating un washed contaminated fruits.

Signs of tapeworms infection

- Passing out faeces containing tape worm eggs and segments.
- Passing out watery stool
- Constant hunger
- Stomachache (Abdominal pain)
- Swelling of the abdomen



FUNCTIONS OF EACH PART

Hook: They enable the tapeworms to attach itself on the walls of the intestines.

Suckers: They enable a tape worm to attach itself on the walls of the intestines.

Effects of tape worm infection

1. It causes malnutrition and poor growth in children.
2. It causes stomach discomfort (abdominal pain)

Ways of controlling tape worms

- Through eating well cooked or properly cooked meat (beef/pork)
- Through drinking properly boiled water
- Through eating properly washed raw greens vegetables
- Through regular deworming

LIVER FLUKES

- They are paper like
- They always live on the liver of an infected animal
- They damage the liver of the infected animal

- Liver flukes can enter the body through drinking un boiled water containing liver flukes.
- It can be controlled through deworming and drinking properly boiled water.



ROUND WORMS (Nematodes)

- They are cylindrical in shape
- Some live in water and other soil
- They are pointed on both ends

Examples of round worms

1. Common round worms
2. Hook worms

3. Eel worms
4. Pin worms

- They live in the intestines and feed in the digested food.
- They enter the body through eating un washed contaminated and raw green vegetables
- They can also be spread through drinking un boiled contaminated water

Ways of controlling round worm infection

1. By eating washed fruits and vegetables
2. By drinking properly boiled water
3. By washing hands before eating food

HOOK WORMS

- Hook worms are found in blood streams.
- They suck blood from the blood streams.

How hook worms enter our bodies.

- Through penetrating through the skin of the feet when we walk with the bare feet in the dirty wet places like latrines.

Ways of controlling hook worm infection

- By wearing shoes or sandals when working or walking in the dirty wet places.

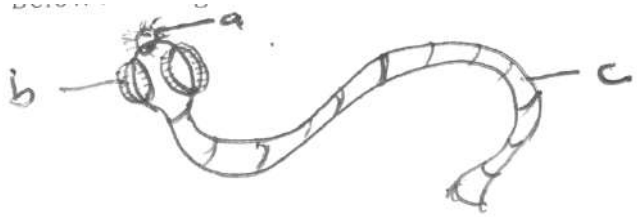
Effects of hook worm infection.

Hook worms suck blood from our bodies and cause hook worm anaemia to the person.

Anaemia is the condition in which a person does not have enough blood in the body.

Activity:

1. Why are worms said to be invertebrates?
2. Below is a diagram showing an example of an endo parasites.



   a) Name the endo-parasite above
   b) Na,e the parts marked

      a) _____ b) _____

3. How useful is part marked (a) to the organism above?

4. State one effect of the above parasite to children.
5. State the best way of controlling the above parasite.
6. Why are people advised to eat properly cooked pork?
7. State the importance of earth worms to the crop farmer.
8. Identify the best way hook worm infection can be controlled.
9. Why do people always wear gumboots when working in the dirty places?
10. What is deworming?
11. Define the following terms
    a) Endo-parasites
    b) Ecto-parasites
12. Which type of worms are
    i) Tape worms
    ii) Hook worms

Arthropods

Arthropods form the largest group of invertebrates.

What are arthropods?

Arthropods are invertebrates with jointed legs and segmented bodies.

Characteristics of arthropods

- They have jointed legs
- They have segmented bodies
- They have exo-skeleton

NB: Arthropods she their outer most cuticle in order to increase in size.

The process of shedding the cuticle is called moulting or ecdysis.

Groups of arthropods

There are four groups of arthropods

1. Myriapods
2. Arachnids
3. Crustaceans
4. Insects

INSECTS

Insects form the largest group of arthropods

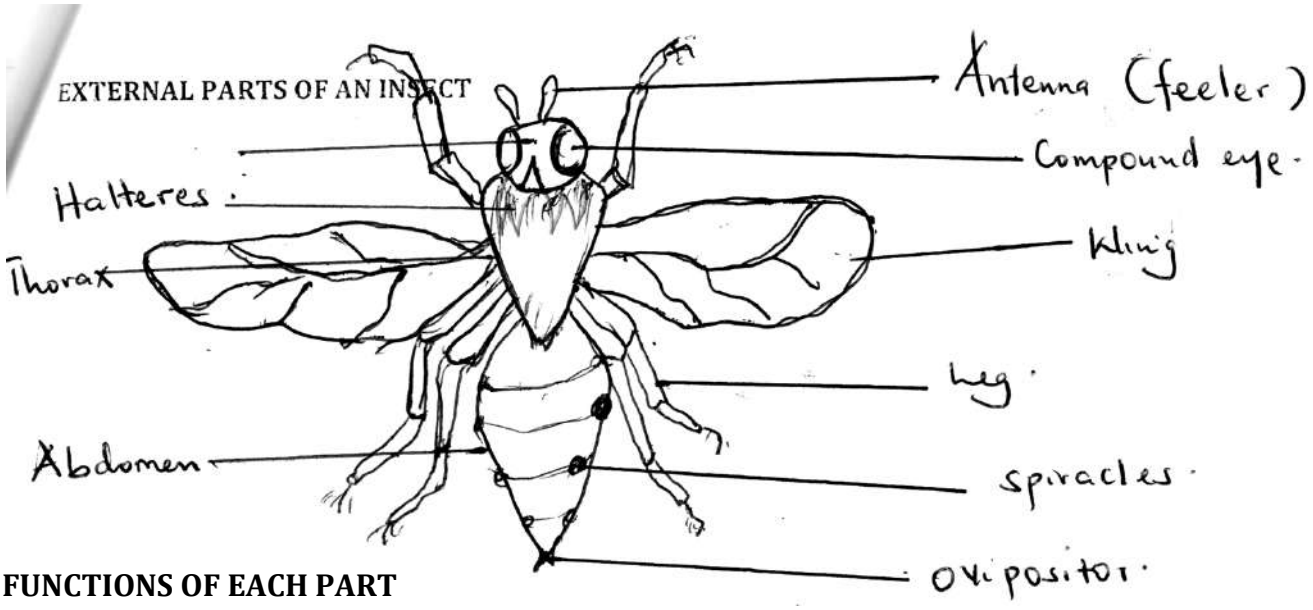
Characteristics of insects

1. They have three main body parts i.e the head, thorax and the abdomen
2. They have three pairs of jointed parts
3. They breathe through the spiracles
4. They have one pair of compound eyes

NB: Insects usually have one or two pairs of wings

Examples of insects

1. Houseflies
2. Mosquitoes
3. Grasshoppers
4. Locusts
5. Butterflies
6. Bees
7. Tsetseflies
8. Dragon flies
9. Beetles
10. Ants



FUNCTIONS OF EACH PART

Head: It consists of the compound eyes and one pair of antenna.

1. **<u>Feelers or antennae</u>**: They are used for sensing danger or feeling.
   i.e They are sense organs for touch and smell. They also detect temperature and sound in the environment.
2. **<u>Eyes</u>** : They are used for seeing.
   Compound eyes are eyes with many eye lenses in it.
3. **<u>Proboscis</u>**: They are used for sucking fluids or juices from food substances.
   <u>Examples of insects which use proboscis for feeling.</u>

1. Houseflies

2. Tsetseflies
3. Bees
4. Dragon flies
5. Mosquitoes

Mandibles : They are used by insets for chewing.

Examples of insects with mandibles

- Grasshoppers
- Locusts
- Cockroaches
- Beetles
- Crickets

4. **Thorax**
   - It has three segments with each carrying a pair of legs.
   - Legs have the suction cups
   - Suction cups help insects to move on ceilings and walls without falling
   - Wings and legs grow from the thorax
   - Halters (balances) also grow from the thorax
   - Wings are used by insects for flying
   - Halters are used by insects to balance an insect to balance in air during flight
5. **Abdomen**

   It has spiracle used by the insects for breathing
   - The abdomen has got the digestive, reproductive and respiratory systems of the insect.
   - Ovipositor are modified into stings
   - Ovipositor is used by an insect for laying eggs
   - Sting is used by an insect for protection by stinging its enemies

LIFE CYCLE (METAMORPHOSIS)

Metamorphosis are stages of growth and development an organism undergo.

There are two types of metamorphosis

1. Complete metamorphosis
2. Incomplete metamorphosis

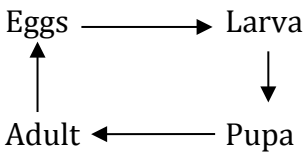
Complete metamorphosis

A complete metamorphosis are the four stages of growth and development insects undergo.

Stages of complete lifecycle

1. Eggs
2. Larva
3. Pupa
4. Adult

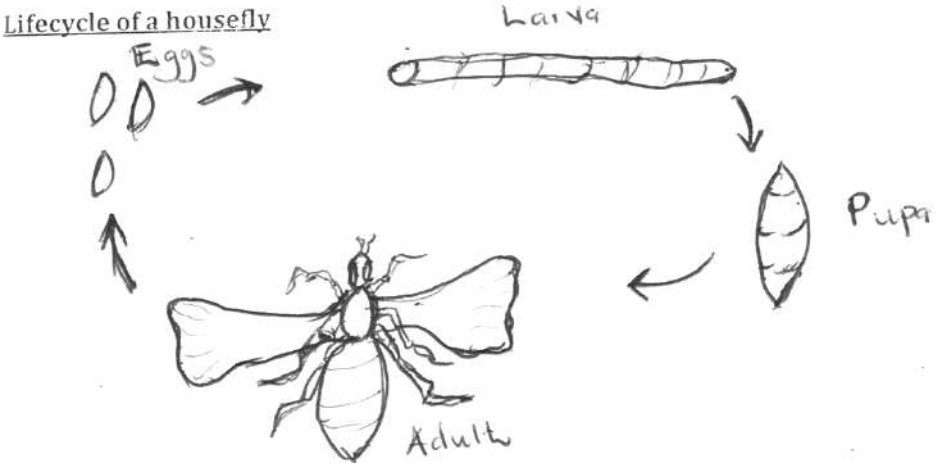
Illustration to show complete life cycle



Examples of insects that undergo complete lifecycle.

1. Houseflies
2. Mosquitoes
3. Bees
4. Butterflies
5. Moths
6. Ants
7. Tsetseflies

Lifecycle of a housefly



- Houseflies lay their eggs in the dirty places like pit latrines, rubbish pits and rotting bodies.
- After one day, eggs hatch into larvae (maggots)
- Maggots feed on decaying matter like faeces and rubbish.
- After 4-6 days maggots turn into pupa.
- Pupa is a dormant stage because during this stage an insect does feed or move.
- After 4-5 days the pupa turns into an adult.
- An adult stage of the housefly is called Imago

NB: The larva stage of the housefly is called a maggot

- The maggots or the larva stage of the housefly is important because it reduces the volume of faeces in the latrine by feeding on them.
- People are not advised to pour oil, insecticides or poisonous substances in the latrine because it can cause death of maggots which would reduce the volume of maggots in the pit latrine.
- The most dangerous stage of a housefly is the adult stage because during the adult stage the housefly is a vector.

Examples of the diseases spread by houseflies

1. Diarrhoea
2. Typhoid
3. Cholera
4. Dysentery
5. Trachoma

Houseflies are adapted to spreading germs because they have got the hairy bodies that carry germs.

How to control diseases spread by houseflies

- Through proper disposal of human wastes in the latrine
- Through covering the cooked leftover food
- Through spraying the houseflies with insecticides
- Observing proper disposal of rubbish at the rubbish pits
- By ensuring cleanliness of the latrines at home.

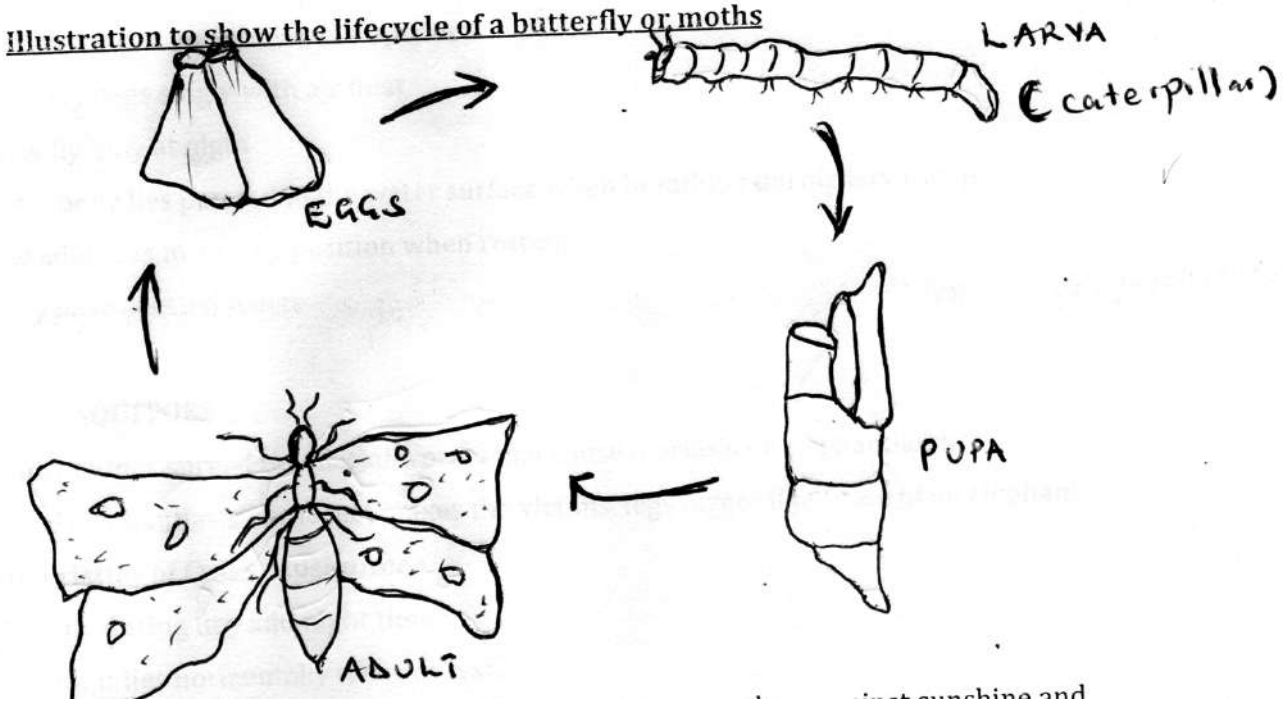
Activity:

1. What are arthropods?
2. Apart from having segmented bodies, state any other characteristics of arthropods.
3. Why is ecdysis useful to arthropod?
4. State the importance of halters to a housefly.
5. Why is a spider not said to be an insect?
6. Which part of an insect is the respiratory and reproductive system located?
7. How is a locust different from a housefly in terms of the lifecycle?
8. Why is a pupa stage of an insect regarded to be a dormant stage?
9. How are houseflies useful to man?
10. State the difference between the housefly and the grasshopper basing on their feeding mechanism.
11. State the chemical method of controlling houseflies in the community.
12. Why does an insect when its abdomen is dipped in water?

BUTTERFLIES AND MOTHS

- Moths are bigger than butterflies but moths fly mainly at night while butterflies fly during day time.

- Moths feed on nectar and other plant juices.
- Moths and butterflies help to carryout pollination of flowers.
- The moth is able to pollinate flowers by the help of the scent produced by flowers at night.



- Butterflies and moths lay their eggs under leaves to protect them against sunshine and predators.
- The eggs hatch into caterpillars and then they feed on leaves.
- The larva stage feeds a lot so that food can be stored to be used in pupa stage.
- In dry places the larva spins a silky thread called a cocoon

A cocoon charges into the pupa (chrysalis)

MOSQUITOES

<u>Types of mosquitoes</u>

1. Anopheles mosquitoes
2. Culex mosquitoes
3. Tiger or Aedes mosquitoes

<u>Anopheles mosquitoes</u>

An infected female anopheles mosquito feeds on blood and spreads plasmodia germs.

A male anopheles feeds on nectar

Plasmodia is a protozoa that causes malaria.

Characteristics of anopheles mosquitoes.

1. They lay eggs singly with air float
2. They fly only at night
3. Their body lies parallel to the water surface when breathing during larva stage.
4. The adult lies in a slopy position when resting
5. They have spotted wings

CULEX MOSQUITOES

Culex mosquitoes spread the filarial worms that cause filariasis or elephantiasis.

It is called elephantiasis because it makes the victims' legs bigger like those of an elephant.

Characteristics of Culex mosquitoes.

1. They fly during day and night time.
2. The adult lies horizontally while at rest.
3. The larva lies at an angle on the water surface when breathing.
4. They lay eggs in a raft form (many together)

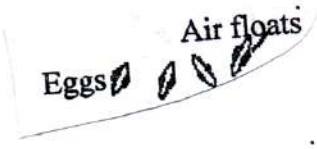
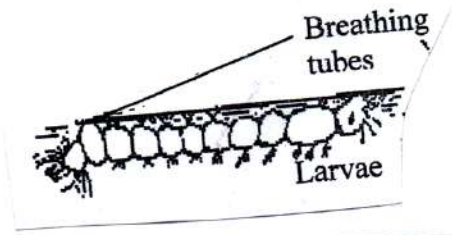
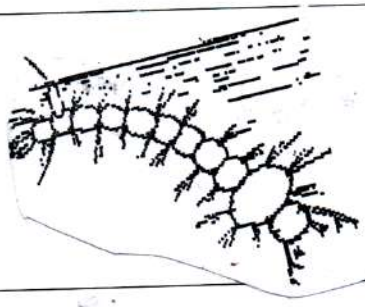
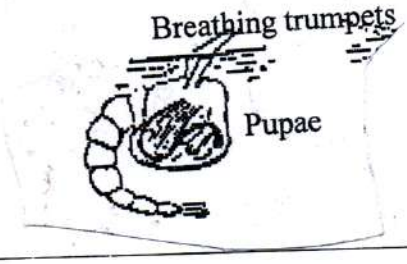
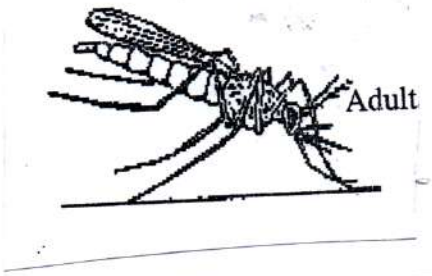
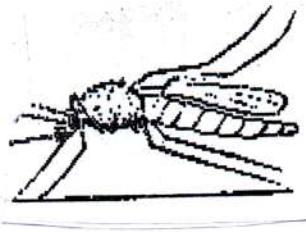
TIGER MOSQUITOES (AEDER MOSQUITO)

1. They lay eggs singly
2. It flies during day time only
3. The adult lies horizontally while at rest
4. Their body has got the black and white spots
5. The larva lies at an angle to the water surface when breathing

Tiger mosquitoes spread the virus that causes yellow fever and dengue fever

- Mosquitoes lay eggs in (i) stagnant water
- After 2-3 days eggs hatch into larva
- The larva begins breathing using the breathing trumpet called the siphon.
- The larva of the mosquito is called the wriggle
- The larva of the mosquito moves by wriggling
- The larva develops into the pupa
- It takes 2-3 weeks from eggs to adult

THE LIFECYCLE OF MOSQUITOES

Anopheles mosquito	Culex mosquito
	
	
	
	

<u>Ways of controlling the diseases spread by mosquitoes.</u>

1. By sleeping under treated mosquito nets.
2. By clearing bushes around the home.
3. Draining the stagnant water at home to reduce breeding of mosquitoes.

4. By removing all broken bottles and pots near the home which can harbor stagnant water.
5. By pouring oil on stagnant water which help to cut off the oxygen supply on the mosquito larva causing their death after suffocation.
6. By introducing fish and frogs in water ponds which help to eat up the mosquito larva.
7. By spraying the mosquitoes at home using the insecticides
8. By fumigating the houses using the doom

NB:

- The biological method of controlling malaria is by introducing the fish and frogs in water ponds to eat up the mosquito larvae.
- The chemical methods of controlling mosquitoes are;
    i) Spraying the environment using insecticide
    ii) By fumigating the house using doom
    iii) By sleeping under well treated mosquito nets

INCOMPLETE METAMORPHOSIS

Incomplete metamorphosis are the stages of growth and development the insects undergo.

The stages of incomplete metamorphosis include;

i) Eggs
ii) Nymph
iii) Adult

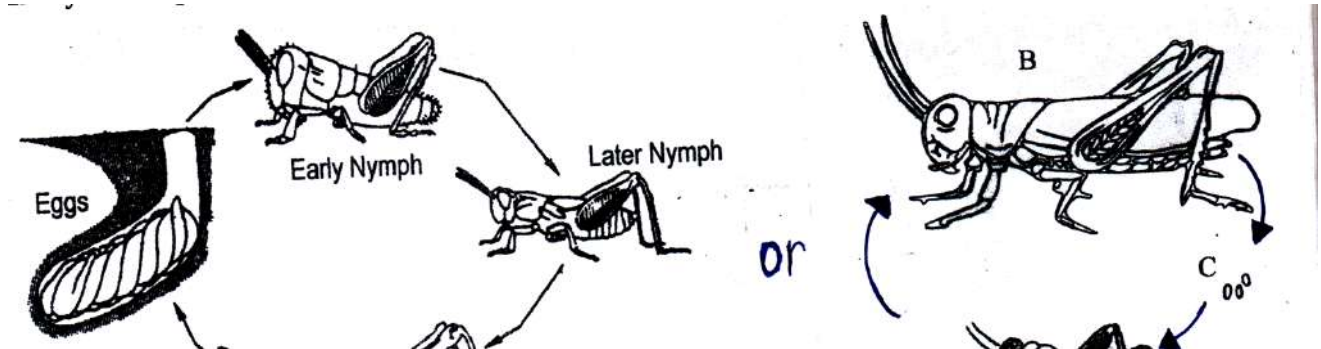
<u>Examples of insects which undergo incomplete lifecycle</u>

1. Grasshoppers
2. Locusts
3. Crickets
4. Termites
5. Praying mantis
6. Cockroaches

GRASSHOPPERS

- Grasshoppers feed on vegetation
- Female grasshoppers after mating with the male one, it lays its eggs in the sand.

Lifecycle of a grasshoppers



Adult stage of locusts and grasshoppers is harmful because during that stage they become pests to the farmer's crops.

COCKROACHES

Cockroaches are disease vectors because they spread germs that cause the following disease

i) Diarrhoea
ii) Polio
iii) Dysentery

Cockroaches also undergo there stages of development i.e the Eggs ⟶ Nymph ⟶ Adult

NB: the Nymph is different from an adult because the adult has fully developed wings while the Nymph has no wings or short wings.

Activity:

1. Why is a siphon useful to the mosquito larva?
2. Why is the larva stage of the butterfly harmful to crop farmers?
3. State one difference between the larva of anopheles mosquito and that of Culex mosquito.
4. State tow ways of controlling mosquitoes at home without using drugs.
5. How is the houseflies adapted to spreading germs?
6. State the danger of stagnant water near the home.
7. How does draining away stagnant water control malaria at home?
8. Which stage of life cycle is a grasshopper harmful to the farmers?
9. Why is a pupa stage of an insect called a dormant stage?
10. What causes malaria?
11. Mention one difference between the anopheles mosquitoes and culex mosquito.
12. State one sign of malaria infection.
13. Why does an insect move when its abdomen is raised when it is on the dusty floor?
14. Mention two insects which feed using the mandibles.
15. How is a bee adapted to carrying out pollination?

ARACHNIDS

Arachnids are arthropods with two main body parts and 4 pairs of jointed legs.

Characteristics of arachnids

1. They have two main body parts i.e cephalothorax and abdomen.
2. They have 4 pair of jointed legs
3. They are wingless
4. They have no feelers (antennae)
5. They have only simple eyes

Examples of arachnids

1. Spiders 2. Scorpion 3. Ticks 4. Mites

SPIDERS

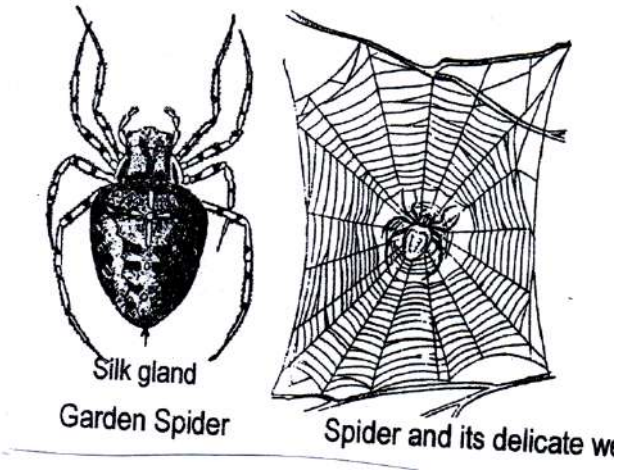
- They breathe through book lungs
- They have the spinnerets on the end of the abdomen which enable them to spin silk.
- Most spiders make webs to trap their prey but those which do not make webs hunt their prey for themselves.
- Spider use the silk to spin webs

Importance of webs to the spiders

1. They are used for protection
2. They are used for trapping their prey

Spiders help to control some insect vectors because they trap them using their webs.

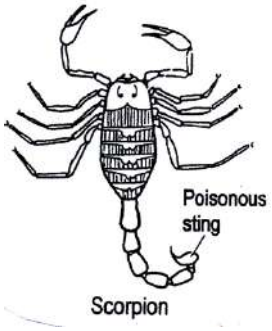
Vectors trapped by the spider webs include mosquitoes, houseflies, tsetseflies



SCORPION

- Scorpions always hide under stones, legs and in holes.
- They have a large tail and a poisonous sting at the end.
- They use the sting to inject poison into the enemies' body.

- Scorpions do not lay eggs but they give birth to the young ones.



TICKS

- They live on the skins of animals and they are vectors and parasites.
- Ticks transmit protozoan germs that cause different diseases called tick borne diseases

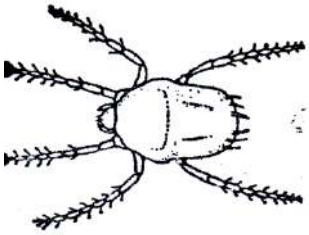
Examples of tick borne diseases in animals i.e cattle

1. East coast fever
2. Heart water
3. Red water
4. Anaplasmosis (Gall sickness)

Examples of tick borne diseases in humans.

Typhus fever

A TICK



Reasons why Arachnids are not classified as insects

1. They have only two main body parts while insects have got three main body parts.
2. Arachnids have 4 pairs of jointed legs while insects have three pairs of jointed legs.
3. Arachnids are wingless while insects have wings.

Arachnids like ticks are controlled in cattle through spraying cattle using acaricides

CRUCTACEANS

These are arthropods with a very hard chalky surface.

Crustaceans have got an exo-skeleton which is very hard.

These animals have a hard and crusty skin. The word **crust** means a hard surface.

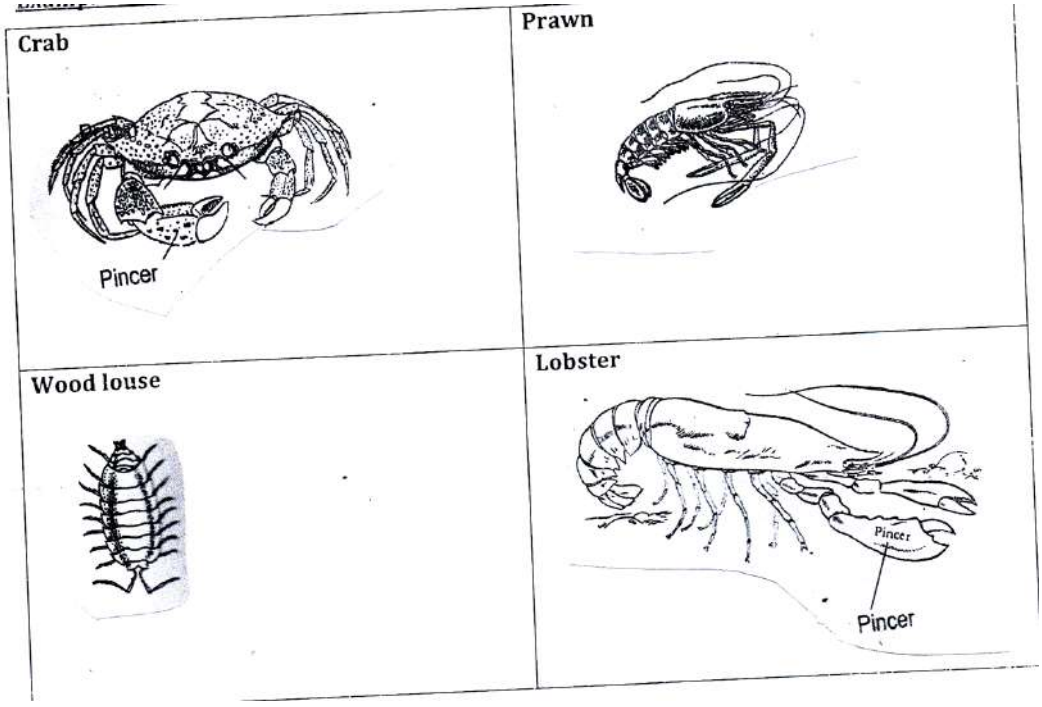
These animals have got very many jointed legs.

They have two main body parts i.e cephalothorax and the abdomen.

Characteristics of crustaceans

1. They have more than 4 pairs of jointed legs.
2. They have two main body parts i.e cephalothorax and abdomen
3. Some live in fresh water others live in salty waters
4. They breathe through gills
5. They have antennae
6. They have hard crusty skins

Examples of crustaceans



MYRIAPODS

These are arthropods with very many jointed legs and segmented bodies.

Groups of myriads

1. Chilopoda (centipedes)
2. Diplopoda (millipedes)

CHILOPODA (CENTIPEDES)

These are long bodies arthropods with one pair of jointed legs on each body segment.

Chilopoda move very fast and feed on small insects and worms.

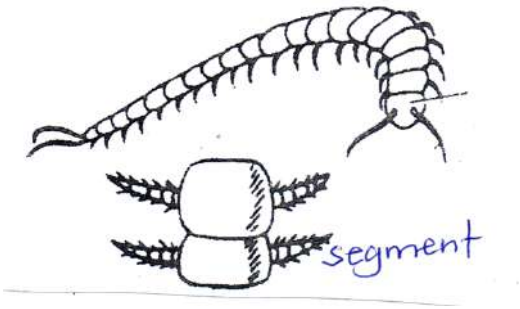
Centipedes are carnivores.

Characteristics of chilopoda (centipedes)

1. They have one pair of legs attached on each body segment
2. They have a pair of antennae

3. They move very fast
4. They feed on insects and worms
5. They are carnivores
6. They are poisonous
7. Their fore limbs are modified into poisonous claws
8. They protect themselves by biting using their front poisonous claws to paralyse their enemies.

The structure of the centipede



DIPLOPODA (MILLIPEDES)

These are arthropods with long round segmented bodies with two pairs of legs in each body segment.

An example of a diplopoda is a millipede.

Characteristics of millipedes

1. They have two pairs of jointed legs on each body segment
2. They move slowly
3. They feed on vegetation (They are herbivores)
4. Most of them produce a bad smelling fluid

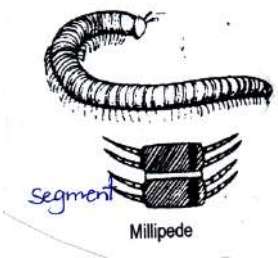
Ways the millipedes protect themselves

1. Through curling or coiling into a ball.
2. By producing a fluid which has an irritating effect on their skin of man

Importance of millipedes

- They carryout soil aeration
- They die and decompose to form humus

Moving millipede



Activity:

1. Why is a spider not regarded as an insect?
2. Mention the protection mechanism for each of the following organisms
   i) Centipede
   ii) Spider
   iii) Millipede
   iv) Scorpion
3. State one way centipedes can be useful to the crop farmer.
4. Which type of skeleton do the crustaceans have?
5. Apart from the abdomen, identify another main body part for arachnids.
6. State one similarity between the arachnids and crustaceans.
7. List two characteristics that make the spider to be called an arthropod.
8. State the difference in feeding habits of the chilopoda and the diplopoda.
9. How are spiders friendly to man in the living house?
10. State the role of the cobwebs to the spiders.
11. Why are ticks said to be parasites?
12. Mention two tick borne diseases in cattle.

SOUND ENERGY

What is sound energy?

- Sound is the form of energy that stimulates the sense of hearing in animals.
- Sound is the form of energy that enables us to hear.
- Sound is the form of energy produced by the vibrating object.

Note:

Energy: This is the ability of doing work.

Vibration: This is the to and fro movement of an object producing sound.

SOURCES OF SOUND

A source of sound is anything that produces sound.

There are two sources of sound i.e

i) Natural sources of sound

ii) Artificial sources of sound

Natural sources of sound

These are things that produce sound by they were made by God.

Examples of natural sources of sound

1. Wind blowing
2. Volcanic eruption
3. Dog barking
4. Child crying
5. Birds singing
6. Thunder
7. Earth quakes
8. Cock crowing
9. Hyena laughing
10. Monkey chattering
11. Rain falling

Artificial sources of sound

These are things that produce sound by they were made by man.

Examples of artificial sources of sound

1. Radios
2. Telephones
3. Tube fiddle
4. Xylophones
5. Drums
6. Whistles
7. Machines in industries
8. Thumb piano,
9. Moving vehicles

How sound is produced?

Sound is produced after vibration of matter.

Methods of producing sound

There are 3 methods of producing sound i.e

i) By plucking / rubbing
ii) Blowing
iii) By knocking/beating/bitting

Producing sound by plucking

1. Playing a guitar
2. Plucking a stretched rubber band
3. Plucking a tube fiddle

Producing sound by blowing

1. Blowing a flute, whistle or horn
2. Blowing a flapper paper
3. Blowing across the mouth of an empty bottle

Producing sound by beating/knocking/hitting

1. Drumming/hitting a drum
2. Knocking a door, tin or a table

3. Knocking stones or clappers

How sound is produced by different living and non-living things.

1. **Mammals** (man): After vibration of the vocal cords.
2. **Bees and mosquitoes**: By rapid flapping of their wings to make air around them to vibrate.
3. **Grasshopper**: By rubbing their hind legs against the vibrating wings to produce sound.
4. **Birds**: By vibration of the rings of cartilage in the trachea.
5. **Drums**: After vibration of the drum skin when it is hit.
6. **Tube fiddle**: After vibration of the plucked string.
7. **Whistle/horn**: After vibration of the air blown into the horm/whistle.

MUSICAL INSTRUMENTS

There are three types of musical instruments i.e.

1) Percussion musical instruments.
2) String musical instruments
3) Wind musical instruments

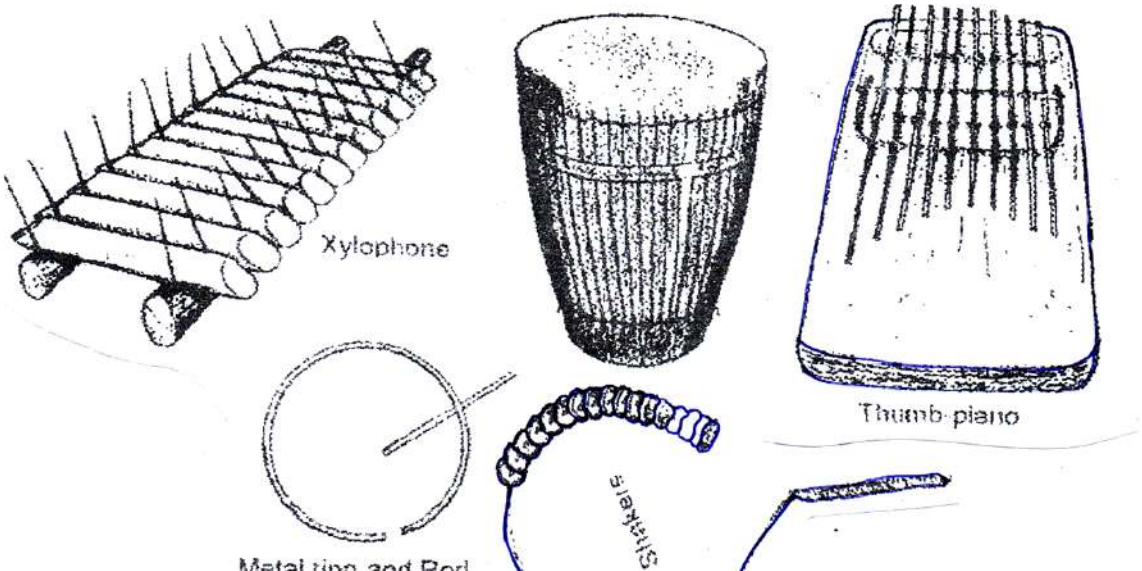
Percussion musical instruments (membranophones)

These are musical instruments that produce sound when they are hit or after being struck.

Examples of percussion musical instruments

1. Drum
2. Xylophones
3. Triangles
4. Thumb piano
5. Shakers
6. cymbals
7. Bells
8. Rattles

Diagram showing examples of percussion musical instrument.



A drum produces sound after vibration of the drum stick being hit.

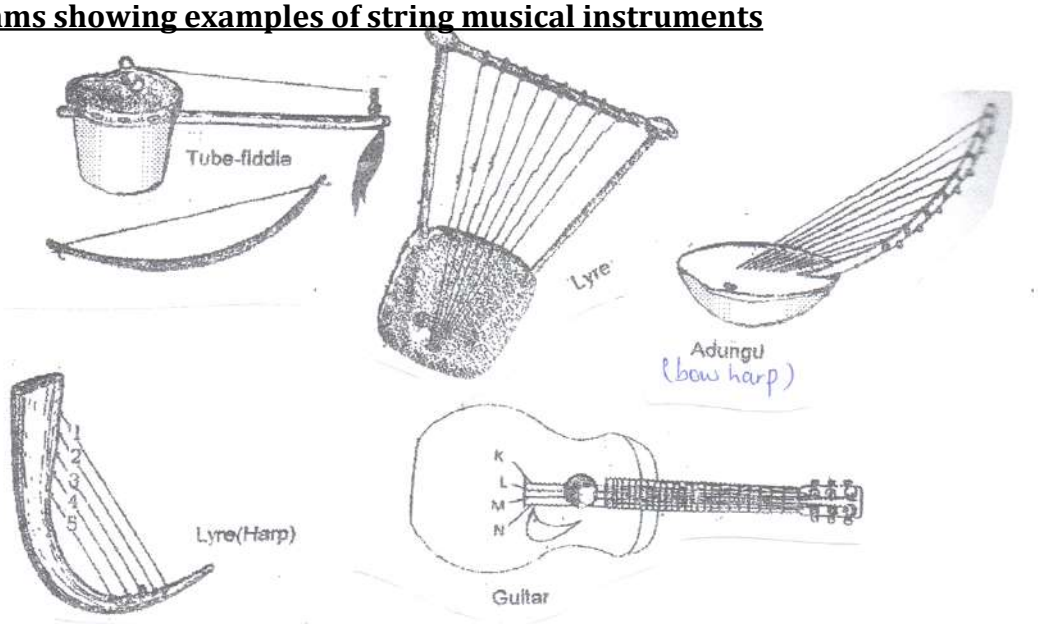
String musical instruments (chordophones)

These are musical instruments which produce sound once their strings are rubbed or plucked.

Examples of string musical instruments

1. Tube fiddle
2. Okelele
3. Violin
4. Guitar
5. Bow harp
6. Lyre

Diagrams showing examples of string musical instruments



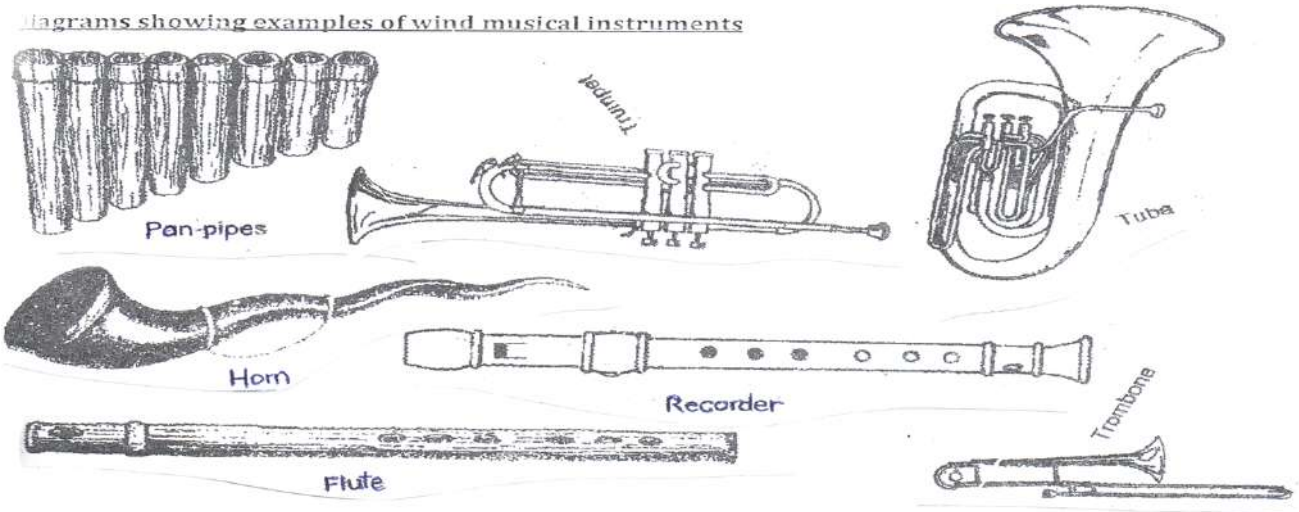
- A string musical instrument produce sound after vibration of the plucked or rubbed string.

Examples of string musical instruments.

1. A flute
2. Trambone
3. Recorder
4. Trumphet
5. Pan pipes
6. Whistle
7. A horn

8. Reeds

Diagrams showing examples of wind musical instruments



NB: Wind musical instruments produce sound after vibration of the air blown in them.

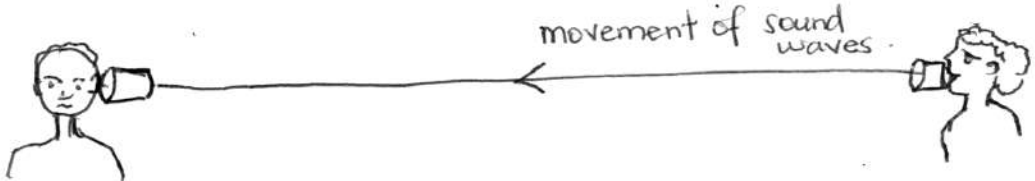
Activity:

1. Why is sound called a form of energy?
2. Identify one natural source of sound.
3. How is sound produced by a bow harp?
4. Give two uses of sound to animals.
5. How do we call the to and fro of movement of an object producing sound?
6. State the difference between the drum and the whistle in the way they produce sound.
7. Apart from sound, state any other two forms of energy.
8. Define each if the following terms
   i) Wind musical instrument
   ii) String musical instrument
   iii) Percussion musical instrument
9. Give two examples of chonophones.
10. What are membrabophones?

HOW SOUND TRAVELS

- Sound travels from one point to another through sound waves in air.
- Sound travels in all directions from the source
- Sound travels in all the three states of matter i.e solids, gases and liquids.
- Sound travels fastest in solids because in solids the molecules are closely packed together which enable higher vibrations of the particles to take place from one particle to another.
- Sound can't travel through a vacuum because in the vacuum there is no any medium for vibration to occur.
- For sound to travel from one point to another, there must be a medium of transmission.

<u>Experiment to show that sound travels in solids using strings and tins.</u>



The above experiment shows or proves that sound travels through solids.

SPEED OF SOUND

Sound travels in all the three states of matter at different speeds as seen below.

a) In normal air (gases) = 330 m/s
b) In water (liquids) = 1480m/sec
c) In solids (iron) = 1500m/s

Factors that affect speed of sound

The following are factors that can either increase or decrease the speed of sound.

i) Temperature
ii) Altitude
iii) Heat
iv) Speed of wind

Temperature: At night when temperatures are very low, sound waves move nearer to the earth surface which makes us hear sound more clearly of night than during day time.

Heat: Heat during day time makes the sound waves rise higher making it difficult for us to hear sound clearly.

Speed of wind: Wind blows sound waves further or in the different direction if is blowing against its movement.

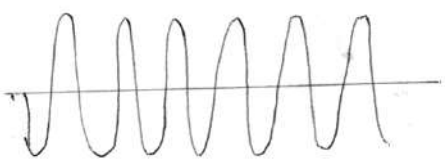
Altitude: Sound waves move more easier along a low altitude than climbing a hill or higher altitude.

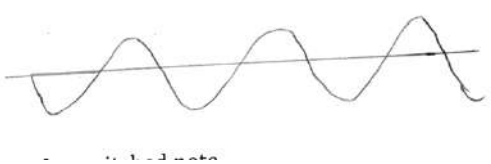
TYPES OF SOUND

1. Music sound
2. Highest and lowest sound (pitch)
3. Loud and soft sound (volume)
4. Noise
5. An echo

Pitch: Pitch is the highness or lowness of sound.

Illustration to show low and high pitched sound notes.

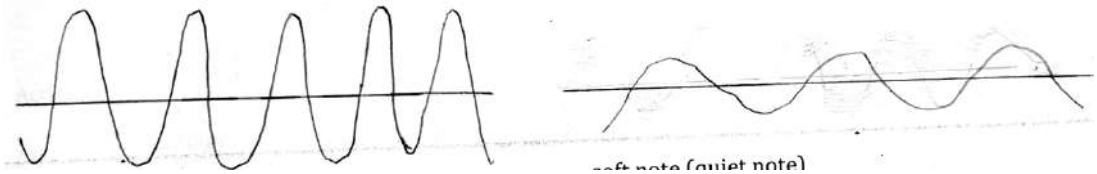




High pitched note **Low pitched note**

Volume: Volume is the loudness or softness of sound.

Illustration to show loud and soft sound notes.



Loud note **soft note (quiet note)**

Music sound: This is the organized sound produced by regular vibrating objects.

Noise: This is a disorganized sound produced by irregular vibrating object.

Illustration to show noise and music notes.



Regular vibration Irregular vibration (noise)

(music)

FREQUENCY

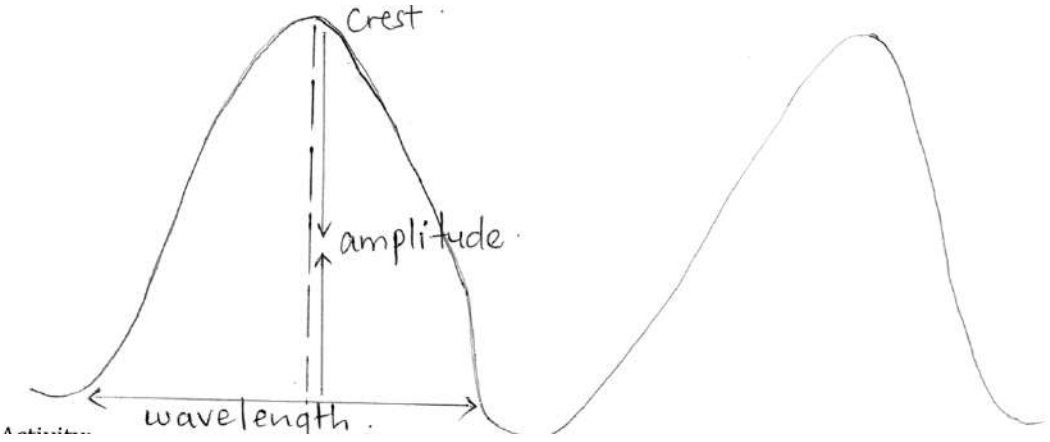
Frequency is the number of vibrations (oscillations) produced by an object per second.

Frequency is measured in hertz (HZ)

Therefore the S1 unites for measuring the sound produced is hertz (HZ)

Amplitude

Amplitude is the maximum displacement made by any vibrating object from one position.



Activity:

1. How does sound travel from one point to another?
2. State the speed of sound in air.
3. Why can't sound travel through a vacuum?
4. In which state of matter does sound travel fastest?
5. Why does sound travel fastest in solids?
6. Define each of the following terms
   a) Pitch
   b) Volume
7. Identify the pitch produced by the objects with the following vibration notes.

8. How is music different from noise?
9. State the difference between sound and light energy.
10. Why are people un able to hear sound more clearly during day time?
11. What is frequency

FACTORS THAT AFFECT PITCH OF SOUND

1. Length of the vibrating object
2. Tension of the vibrating surface
3. Nature of the vibrating object
4. Size of the vibrating object
5. Temperature
6. Frequency
7. Thickness of the vibrating surface

Length of the vibrating surface
Long strings produce low pitches of sound while shorter strings produce higher pitches of sound.

Tension of the string: (Tightness or looseness of the string)
Tight strings produce higher pitch of sound than the loosened strings.

Nature of the material used to produce sound
Metallic objects produce higher pitch of sound while those made from plastic and wood produce lower pitch of sound.

Thickness of the vibrating surface
Thick strings produce lower pitch of sound while thin strings produce higher pitch of sound.

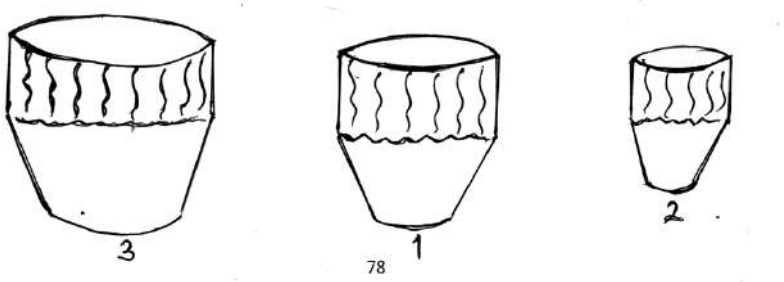
Sizes of the vibrating object

Bigger objects produce low pitch sound while small objects produce higher pitch of sound.

Frequency: The higher the frequency the higher the pitch while the lower the frequency the lower the pitch of sound.

Experiment to illustrate factors that affect the pitch of sound.

a) **Using different sized drums**

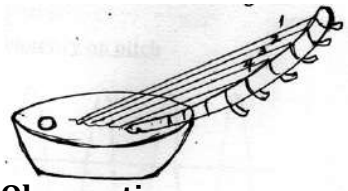


Observation

Drum marked **2** will produce the highest pitch while drum 3 produce the lowest pitch.

Reason: Drum marked 2 has got a smaller surface area for vibration while drum marked 3 has got a larger surface area for vibration.

b) **Using the strings of different length**

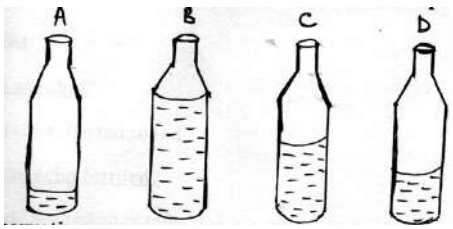


Observation:

When plucked, strings marked 1 will produce the lowest pitch of sound while string 4 will produce the highest pitch of sound.

Reason: String 1 is long so it produces low vibration while string 4 is short so its produces high vibration.

c) **Using bottles of water with water at different capacities**

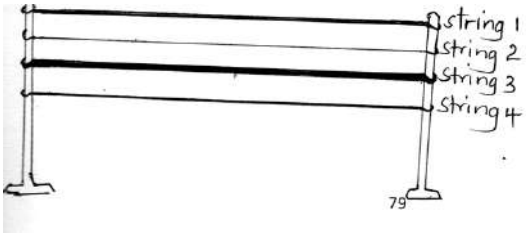


Observation

When air is blown in each bottle, bottle marked B will produce the highest pitch while bottle marked A produces the lowest pitch.

Reason: Bottle marked B has got a small surface area for air vibration while bottle marked A has got larger surface area for vibration.

d) **Using strings at different thickness**



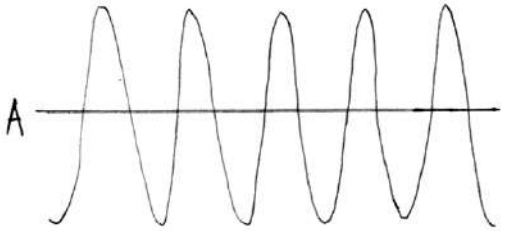
Observation

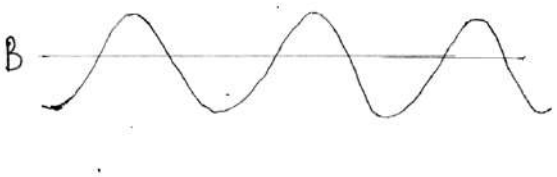
String marked 2 will produce the highest pitch while string marked 3 will produce the lowest pitch.

Reason:

String marked 2 has got a smaller surface area for vibration while string marked 3 has got a wider surface area for vibration.

Effect of frequency on pitch





A
- High pitch
- High frequency
- Loud sound

- Low pitch
- Low frequency
- Soft sound

AN ECHO

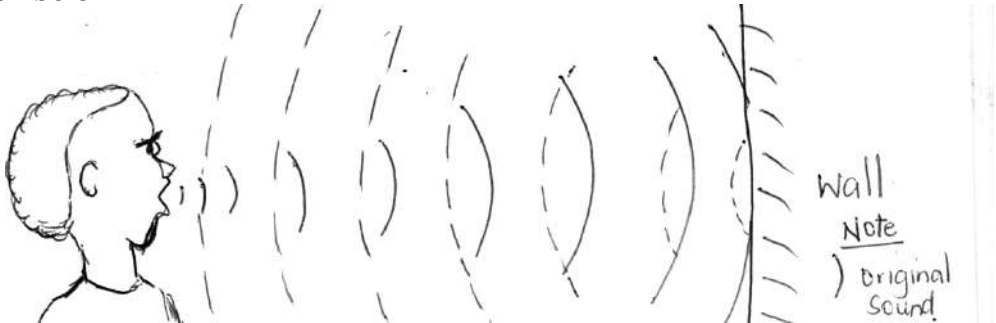
What is an echo?

An echo is a reflected sound.

How is an echo formed?

An echo is formed after reflection of sound waves when they meet any obstacle.

When sound waves meet an obstacle like the walls, mountain, thick forests it is bounced back as seen below.



The wave length of the original sound is very high compared to that of an echo.

This means that the original sound has got higher pitches than an echo and that is the reason why we are able to hear words clearly in an echo.

Areas where echoes are formed.

1. Empty rooms
2. Valleys
3. Corridors
4. Mountains
5. Forests
6. Caves

Smooth and hard surfaces produce the best echoes while rough and soft surface absorb sound to reduce the echo.

Disadvantages of echoes

- Echoes cause formation of noise which makes hearing process difficult to man.

How are echoes reduced in music studios and theatres

1. By constructing the walls with soft porous boards.
2. By putting curtains in the walls.
3. By putting holes in the walls.

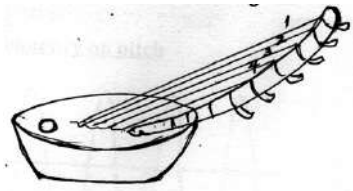
NB: The soft porous boards help to reduce the echo by absorbing the sound produced.

Advantages of echoes.

1. Echo is used by sailors to detect the depth of water bodies and this is done by the use of sonar machine on ships.
2. It is used by pilots to detect mountains, tall buildings to prevent them from causing accidents.
3. Echo enables animals like bats to locate food and dodge obstacle during flying at night.
4. Sea animals like whales and dolphins to detect obstacle like rocks and also their enemies in water.

Activity:

1. How are echoes reduced in cinema walls?
2. Below is a musical instrument, use it to answer the following questions



   a) Which type of musical instrument is shown above?
   b) Identify the method used to produce sound with above instrument.
   c) Which of the strings will produce
      i) Highest pitch
      ii) Lowest pitch
   d) How does the above instrument produce sound?
3. State the importance of echo to bats.
4. How does the soft porous boards reduce eco in the music studio?
5. Which of the strings below will produce the lowest pitch of sound.

   A ——————————— B

   Q ——————————— R
6. Identify two factors that affect the pitch of sound.
7. What is an echo?
8. How is an echo formed?
9. What effect does an echo cause on the hearing process?
10. How does frequency affect pitch of sound?

CALCULATIONS OF SOUND

Note: Speed of sound in air is 330m/s

Formular

Distance = Speed x Time

$$\text{Time} = \frac{\text{Distance}}{\text{Speed}}$$

NB: If it is an echo divide the distance by 2.

- If it is an echo multiply the time by 2.

Calculating distance covered by sound/echo

Example I:

Musa heard a gunshot after 3 seconds. How far was Musa from the firing place?

T = 3 sec

S = 330 m/s

Distance = Speed X Time

D = S x T

D = (330 x 3)

D = 990 metres

Example II

John heard an echo of a man splitting firewood from the forest after 4 seconds. How far was John from the man?

T = 4 sec

S = 330 m/s

D = (SxT)

D = (330 x 4)

D = 1320 (it is an echo)

D = 1320 ÷ 2

D = 660 metres

Example III

Mugisha shouted from the valley and it took 5 seconds for Ruth to hear the sound. How far was Mugisha from Ruth?

T = 5 secs

S = 330m/s

D = S X T

D = (330 x 5)

D = 1650 metres

Example IV

Samson heard an echo of the radio after 10 seconds. How far was Samson from the radio?

T = 10 sec

S = 330 m/s

D = S X T

D = (330 x 10)

D = 3300 metres (it is an echo)

D = 3300 ÷ 2

D = 1650 metres

Calculating time taken to hear sound or echo.

Example I:

Fatumah was standing in the valley which was 660m deep and she heard a man clapping hands. How long did it take Fatumah to hear the sound of the claps?

D = 660m

S = 330m/s

$$T = \frac{D}{S}$$

$$T = \frac{660\ m}{330\ m/s}$$

T = 2 seconds

Example II

Jane was standing on the cliff which was 990 metres high and she heard an echo of a cock crocking. How long did it take her to hear the echo of the cock crocking?

D = 990m
S = 330m/s

$$T = \frac{D}{S}$$

$$T = \frac{990m}{330m/s}$$

T = 3 seconds (it was an echo)

T = 3 X2

T = 6 seconds

Activity:

1. Paul heard John calling him from a distance of 2310 metres. How long did it take Paul to hear John's call?
2. Betty heard a monkey chattering echo in the forest after 2 seconds. How far was Betty from the monkey?
3. Moses was 330m/s from his mother, the mother clapped her hands. How long did it take Moses to hear her mother's claps
4. It took 5 seconds for children to hear the sound of music from the nearby town. How far was the town from where children were standing?
5. John stood on top of the cliff which was 1320 metres high. It took how long for the sister to hear the echo of John calling her from the cliff?
6. If Opio fell in a pit but it took 12 seconds for the brother to hear him yelling for help. How deep was the pit?

STORAGE OF SOUND

Sound can be stored for future use using the following methods.

a) By recording sound
b) By writing music sound in staff or solfa notes
c) By tapping sound

Ways of storing sound by recording

- By recording sound using magnetic tapes

- By recording sound using video tapes
- By recording sound using gramo phones
- By recording sound using video compact discs
- By recording sound using computer diskettes
- By recording sound using a radio cassette.
- By recording sound using digital video discs
- By recording sound using cine films
- By recording sound using memory cards

Devices used for recording sound

1. Magnetic tapes
2. Video tapes
3. Gramo phones
4. Video compact discs
5. Computer diskettes
6. Radio cassettes
7. Digital video discs
8. Cine films
9. Memory cards

How to reproduce the stored sound

- By replaying the recorded sound using a cassette radio player
- By replaying the recorded sound using the video players
- By replaying the stored sound using the digital video disc players
- By replaying the stored sound using the film projectors
- By replaying the stored sound using the gramo phones
- By replaying the stored sound using the video disc players
- By replaying the stored sound using the computers
- By singing the staff or solfa notes

Reasons / advantages of storing sound

- For future reference
- For entertainment from music sound stored
- Stored sound is used to give evidence in courts of law
- Stored sound is used for reporting things which have happened by news reporters
- Stored sound can act as a reminder to the person who has stored it.

MUSIC SCALES

Music scales consists of notes called diatonic scale.

Types of music notes

1. Solfa notation scale
2. Staff notation scale

Notation: This is an act of writing music sound using notes.

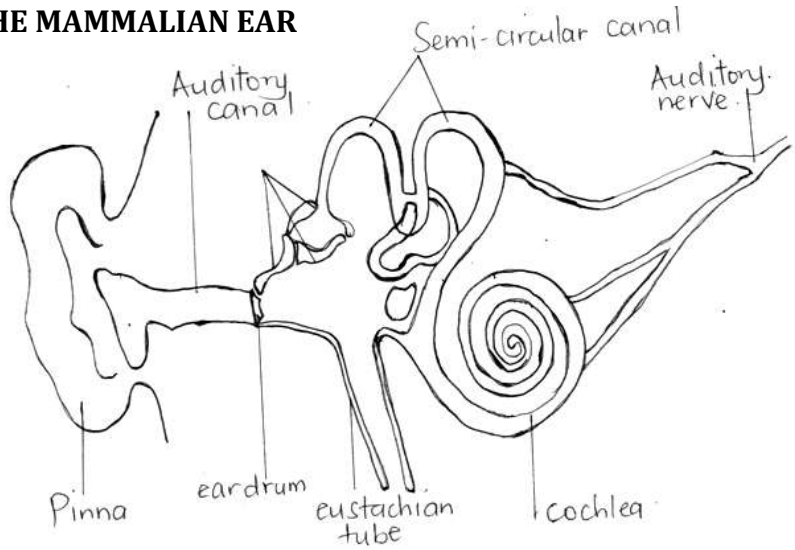
Staff notation scale

Solfa notation scale

Devices used for reproducing stored/recorded sound

1. Cassette radio
2. Video player
3. Digital video player
4. Film projector
5. Gramo phones
6. Video compact disc player
7. Computers

THE MAMMALIAN EAR



FUNCTIONS OF EACH PART

OUTER EAR: It consists of the following parts.

i) Pinna
ii) Auditory canal

1. Pinna: It collects sound waves from the environment and directs them to the auditory canal/ear canal.
2. Auditory canal: It conducts or directs sound waves to the ear drum.

- Pinna is broad or wide enough for easy collection of sound waves from the environment.

- Auditory canal has got the ear wax and the short hair which help to trap dust entering the ear.

MIDDLE EAR: It consists of the following parts.

i) Ear drum
ii) Ossicles
iii) Eustachian tube
iv) Oval window

3. **Ear drum**
   It changes sound waves into vibrations and send the vibrations to the ossicles.
   It vibrates and sends the vibration to the ossicles.
4. **<u>Ossicles</u>**
   These are three bones found in the middle ear and they include;
   i) Hammer (malleus)
   ii) Anvil (incus)
   iii) Stirrup (Stapes)

   These bones can be understood well in their correct order using words 'HAS' or 'MIS'

   Ossicles help to amplify and transmit the vibration to the inner ear.
5. **Oval windows**: It prevents the fluid in the inner ear from mixing up with the fluid in the middle ear.
6. **Eustachain tube**: It equalizes or balances the air pressure on both sides of the ear drum.
   - It is the tube that connects or leads the middle ear to the mouth.

NB: people always yawn in the morning after waking up in order to allow in air so that the air pressure is balanced on both sides of the ear drum by the help of the Eustachian tube.

INNER EAR

It consists of the following parts and it is filled with fluids i.e end lymph and peri lymph.

i) Semi-circular canal
ii) Cochlea
iii) Auditory nerves

7. **Semi-circular canal**: It balances the body. (It helps to maintain body balance and posture
8. **Cochlea:** It changes the sound vibrations into sound impulses or sound messages and send them to the auditory nerves.
9. **Auditory nerves:** It conducts sound impulses or sound messages to the brain for interpretation.

How do we hear?

- Pinna collects sound waves from the environment and directs to the ear drum through the auditory canal.
- Ear drum vibrates and sends the vibration to the ossicles causing them also to vibrate (shake)
- The ossicles amplify and transmit the vibration across the middle ear to the cochlea.
- The cochlea changes the vibration into sound impulses and sends them to the auditory nerves.
- The auditory nerves conduct sound impulses to the brain for interpretation.
- Then the brain interprets the sound messages and sends the signals back to enable us hear the sound produced.

Ways of caring for our ears.

- By regular washing of the ears during bathing.
- By using the ear buds or the corner of the towel to remove wax from the ears.
- By staying in the noise free environment because too much noise causes damage to the ear drum.
- By wearing the ear protective gargets when working in the noisy environment.
- People should avoid using the sharp piercing objects like needles to remove the ear wax because such objects can pierce the ear drum and cause permanent deafness.
- By seeking for proper medical attention in case of any foreign body in the ear.

DISEASES OF THE EARS

1. Ear ache (otalgia)
2. Otitis media
3. Otitis Externa
4. Boils
5. Labyrinthitis (caused by infection e.g mumps and chicken pox)

Ear defects

1. Deafness
2. Ear ringing
3. Boils

What is deafness?

Deafness is the condition when a person is un able to hear sound produced.

Types of deafness

1. Partial deafness
2. Permanent deafness
3. Sensory deafness

Permanent deafness:

This is the condition when a person can't hear any sound produced.

It is caused by serious damage on the ear drum and some diseases like German measles.

Partial deafness

This is the condition when a person can't hear clearly the sound produced.

This is caused by too much wax in the ear and damage on the ear drum.

Sensory deafness

This is the condition when a person can't differentiate between the sound produced.

It is caused by too much noise in the environment.

CAUSES OF DEAFNESS

1. Old age
2. Disease like German measles
3. Serious fracture on the skull
4. Too much wax in the ears
5. Damage of the ear drum

Activity:

1. Give two uses of stored sound.
2. Mention two ways used for recording sound.
3. State the importance of the ear wax.
4. How is the ear connected to the brain?
5. Identify two devices used for reproducing the stored sound.
6. Why are people not advised to use the sharp piercing objects to remove the ear wax?
7. Differentiate between partial deafness and sensory deafness.
8. How is the ear pinna suitable to carry out its purpose?
9. What name is given to the three bones found in the middle ear?

10. Apart from hearing, state any other use of ears to man.
11. Which part of the ears helps in body balancing?
12. How is sound transmitted from the middle ear to the inner ear?
13. Give two uses of sound to man.
14. Why is too much wax harmful in our ears?
15. How is music sound stored in notation form reproduced?
16. List two methods of producing sound.

ALCOHOL, SMOKING AND DRUNGS

What is alcohol?

Alcohol is any liquid substance which when introduced in the body makes one to become drunk.

Why is alcohol called a drug?

Alcohol is called a drug because when it is introduced in the body, it can increase or decrease the body functioning.

Types of alcohol

1. Methanol or Methyl alcohol
2. Ethanol or Ethyl alcohol

METHANOL OR METHYL ALCOHOL

This is the types of alcohol which is very poisonous and it can cause blindness when it comes into contact with the eyes.

ETHANOL (ETHYL ALCOHOL)

This is a toxic substance contained in all alcoholic drinks like beers, wines and spirits.

METHODS OF PROCESSING ALCOHOL

There are two methods of making alcohol, namely:-

1. Distillation method
2. Fermentation method

FERMENTATION METHOD

This is the process of converting sugars into ethanol by applying yeast in the absence of oxygen. Fermentation process is an aerobic respiration which is caused carried out by enzyme zymase. Yeast produces the enzyme zymase which speeds up the fermentation process to produce ethanol.

In fermentation process the sugar solution is mixed with yeast and made to decompose an aerobically to form alcohol.

NB: The type of alcohol got through fermentation method is Ethanol or Ethyl alcohol.

Examples of materials used to make alcohol by fermentation

i) Pine apples
ii) Maize
iii) Sorghum
iv) Banana
v) Sugarcanes

Alcohol processed by the fermentation method is not very concentrated like the one got by distillation method.

Examples of alcohol obtained by fermentation

i) Malwa
ii) Kwete
iii) Tonto
iv) Pineapple juice (munanansi)

DISTILLATION METHOD

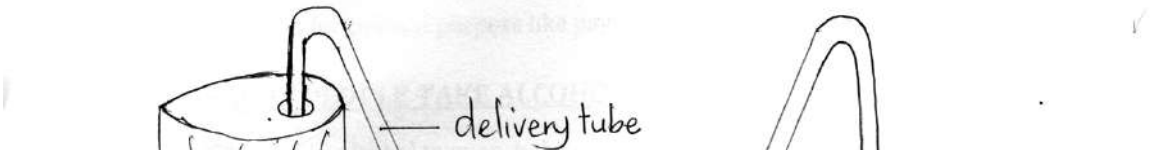
This is the method of making alcohol that involves boiling crude and obtain concentrated alcohol by evaporation.

In distillation, alcohol obtained is very concentrated.

Examples of distilled alcohol drinks

1. Corn alcohol from corn maize
2. Waragi (Enguli)

The diagram showing alcohol distillation



Cold water is used to condense the alcohol vapour into a distillate.

The delivery tube is coiled in cold water to increase the surface for condensation of alcohol vapour.

Methyl alcohol is obtained by distillation method.

Local distillation of alcohol is not allowed because the alcohol obtained is sometime very concentrated and very poisonous to man.

NB: The boiling point of alcohol (ethanol) is **78°C**

USES OF ALCOHOL

- It is used in the making of soap and medicine.
- Alcohol is mixed with petrol to make gasnol fuel.
- Alcohol is used in sterilization of medical instruments which can't be sterilized by boiling like clinical thermometers.
- Alcohol is used in the six's thermometer to shoe readings
- It is used as a solvent so it can be used in cleaning as it dissolves oils and fats in clothes.
- They are used in hospitals to sterilize on the skin where injections are to be taken.
- Alcohol is sold to get income by people.
- Alcohol provides employment opportunities to people.
- Alcohol is used in some vehicles as a fuel.
- Alcohol is used to make some costumes and perfumes.
- Alcohol is a source of government income through exporting alcohol to other countries
- Alcohol is used for cultural purpose like paying dowry.

REASONS WHY PEOPLE TAKE ALCOHOL

- Some people take alcohol to quench thirst.

- Some people take alcohol to forget their social economic problems.
- Some people take alcohol to socialize with others.
- Some people take alcohol to be confident.
- Some people think that alcohol improves up on sexual abilities.
- Some people take alcohol to relax their minds.
- Some people take alcohol thinking that it improves upon mental performances.
- Some people tale alcohol because they are happy.
- Some people take alcohol to celebrate victory.
- Some people take alcohol due to bad peer group influence.
- Some people take alcohol to run away from their fear and frustrations.
- Some people take alcohol to pretend to be mature if they are still young.
- Some people take alcohol to kill boredom.
- To pass time.

Activity:

1. Why is alcohol called a drug?
2. Give two methods used to make alcohol
3. Which method is used in to process malwa?
4. State one importance of alcohol to medical officers.
5. Which type of thermometer uses alcohol to operate?
6. State the boiling point of alcohol.
7. State two reasons people give for taking alcohol.
8. Of what importance is cold water during alcohol distillation?
9. State the scientific name given to the final product in alcohol distillation.
10. Point out the economic importance of alcohol to man.
11. Of what role is yeast during the process of alcohol by fermentation?
12. List the cultural reason of making alcohol.

ALCOHOLISM

Alcoholism is the condition that results from the regular taking or depending on alcohol for the normal body functioning.

ALCOHOLIC

This is a person who regularly depend on alcohol for the normal body functioning.

Body organs damaged by excessive alcoholism

1. Liver
2. Stomach
3. Brain
4. Pancreas

A person suffering from alcoholism is called an alcoholic.

EFFECTS OF ALCOHOL TO AN INDIVIDUAL

1. It causes brain damage to an individual
2. It leads to self neglect
3. It causes severe damage to body organs like the stomach, the liver etc
4. It causes loss of respect
5. It causes loss of jobs
6. It can lead to poverty to an individual because most of the money will be spent on buying alcohol.
7. Alcohol affects the person's nervous system making them un stable and always shaking their hands.
8. Alcohol affects the body balancing by causing damage to the semi-circular canal of the ears.

Signs of brain damage.

1. Progressive/constant forgetfulness (loss of memory)
2. In ability to concentrate on what they are doing
3. Less thinking
4. Nervousness

EFFECTS OF ALCOHOL TO THE FAMILY

- It causes violence in the family because the drunkards are aggressive and quarrelsome.
- It causes destruction of the household property.
- It causes family neglect as most of the money will be spent on buying alcohol.

- It causes child abuse in the family due to the corporal punishments and denying of food and education to children.
- It can cause family divorce due to constant misunderstanding between the wife and husband.
- It causes low family development
- It can lead to the easy spread of diseases between the wife and husbands like HIV/AIDS
- It makes the children in the family also copy the same habit of alcoholism from the parents.

EFFECTS OF ALCOHOL TO THE COMMUNITY

1. It increases on the crime rates in the community like theft, kidnapping, defilement, rape
2. It leads to low community development
3. It can lead to accidents due to drunkard drivers
4. Alcoholism can result into other antisocial behaviours like theft, rape, defilement in the community.

WAYS OF AVOIDING ALCOHOLISM

- By avoiding the bad peer groups like those who take alcohol.
- By joining good social groups like which do not take alcohol like sports clubs, reading groups, music dance and drama during the leisure time.
- By avoiding tasting any alcoholic drink for pleasure.
- By learning more facts about alcohol and its side effects before taking it.

Life skills one should have in order to avoid alcoholism

1. Having a skill of responsibility
2. Being a good decision maker
3. Having a skill of self awareness
4. Having a skill of assertiveness
5. Having a skill of self esteem
6. Having a skill of problem solving ability

UGANDA LAWS AGAINST ALCOHOL

1. All forms of home distillations are not allowed.
2. People below the age of 18 years of age are not allowed to take alcohol.
3. People are not allowed to drive the vehicles under the influence of alcohol.

4. Bars with proper licences are required to maintain certain standards as laid down by the law during their operation.
5. Customers are not allowed to take alcohol in the off licenced bars.

Activity:

1. Who is an alcoholic?
2. Identify three body organs which are highly affected by excessive alcoholism
3. Which Uganda law against alcohol restricts John who is in P.6 not to take alcohol?
4. Point out two effects of alcohol to the family.
5. Why is alcoholism a bad habit to the community?
6. Identify the reason why drivers should have to avoid alcoholism.
7. What is alcoholism?

SMOKING

What is smoking?

Smoking is an act of inhaling the tobacco smoke directly or indirectly from the burning cigarette.

Types of smoking

1. Active smoking
2. Passive smoking

Active smoking

This is an act of inhaling tobacco smoke directly from a burning cigarette.

Passive smoking:

This is an act of inhaling tobacco smoke indirectly from an active smoker.

Passive smoking is very dangerous because it affects all people around the active smoker.

Ways how tobacco is introduced in the body

1. By chewing tobacco leaves.
2. By sniffing tobacco powder in the nose
3. By inhaling the tobacco smoke set on fire

Poisonous substances found in tobacco

1. **Tar**: causes lung cancer
2. **Nicotine**: causes addiction to smoking tobacco

The poisonous gas contained in tobacco is carbon-monoxide - reduces the amount of oxygen in blood.

The poisonous drug that causes addiction to tobacco is Nicotine.

Reasons why people smoke

1. To reflex their minds and feel at ease.
2. To concentrate on what they are doing
3. To feel warm on the cold days
4. To socialize with others
5. Due to bad peer group influence
6. To kill boredom
7. To pretend to be mature in case of young ones
8. To pass time
9. Some people smoke because they are idle i.e they lack what to do.

EFFECTS OF SMOKING TO AN INDIVIDUAL

1. Smoking causes the respiratory diseases to man like lung cancer, emphysema and Bronchitis
2. Smoking lowers the life span of an individual because it causes damage to the liver, lungs etc
3. Smoking causes poverty to an individual
4. Smoking can lead to loss of jobs
5. It causes loss of friends to an individual
6. It causes discolouring of the teeth and the lips
7. It makes one lose energy easily
8. It worsens the health of a person with tuberculosis and asthma
9. It causes self-neglect
10. It causes loss of respect

DANGERS OF SMOKING TO THE FAMILY

1. It causes family neglect
2. It causes poverty to the family

3. It encourages passive smoking to other members of the family which will result into respiratory diseases
4. It makes the children also copy the bad habit of smoking from those family members smoking.
5. It causes low family development

Effects of smoking to the pregnant woman

1. It makes the pregnant woman give birth to under weight babies
2. It can lead miscarriages to pregnant women
3. It can cause pre-mature giving birth and still birth to the pregnant women.
4. It causes the respiratory diseases to the pregnant woman.
5. It makes them get poor appetite to for which will make them give birth to un healthy babies.

Diseases brought by smoking

1. Lung cancer
2. Bronchitis
3. Emphysema
4. Heart diseases
5. Cancer of the mouth and throats

Body organs affected by excessive smoking

1. Liver
2. Teeth
3. Lungs
4. Skin

Effects of smoking to the community.

1. It encourages passive smoking in the community which results into respiratory diseases.
2. It can result wirh low community development
3. It causes air pollutuion in the community

- Smoking in public is discouraged because it can lead to passive smoking which causes respiratory diseases to people.

- Smoking near petrol stations is not allowed because it can cause fire our break.

Ways of avoiding smoking

1. By avoiding bad peer groups like those who smoke.
2. By keeping yourself busy during the leisure time through doing sports activities, music and reading clubs.
3. By finding the bad effects of smoking before smoking
4. By joining good social groups like those which do not smoke to avoid temptation to smoke.
5. By destroying all substances related to smoking like tobacco.
6. By avoiding listening to all advertisements about cigarettes.

Life skills one should have to avoid smoking.

1. A skill of responsibility
2. A skill of self awareness
3. A skill of assertiveness
4. A skill of good decision making
5. A skill of problem solving ability
6. A skill of self esteem
7. Ability to copy up with stress or problems

Ways the government can discourage smoking

1. By putting strict laws against public smoking
2. By imposing high taxes on tobacco products to discourage production
3. Providing employment opportunities to the people who seem to be idle to discourage smoking habit.
4. Through sensitizing the people the dangers of smoking through public health education seminars.

Activity:

1. State one effect of smoking to a pregnant mothers.
2. Who is a) A passive smoker
   b) An active smoker
3. Identify two respiratory diseases brought by excessive smoking.

4. Apart from lungs, state any other body organ affected by smoking.
5. Identify the addictive drug contained in tobacco.
6. Why is smoking near petrol station harmful?
7. Point out one effect of smoking to the family.
8. Which advice can you give to your friend in P.6 who has begun smoking?
9. Give three reasons people give for smoking.
10. Point out one of the health problems associated with smoking habits.

DRUGS

What is a drug?

A drug is any chemical substance which when introduced in the body can change the normal body functioning.

TYPES OF DRUGS

There are two types of drugs

1. Laboratory manufactured drugs
2. Traditional drugs

Laboratory manufactured drugs

These are drugs which are made and tested well by physicians in the laboratory.

Examples of laboratory manufactured drugs

- Aspirin
- Chloroquine
- Fansidar
- Panadol
- Zental
- Flagyl
- Septrin
- Mabendazole

Characteristics or qualities of laboratory manufactured drugs

1. They are made carefully and tested well before use.
2. They have high purity.
3. Their strength and stability is well known
4. Their effect on human health is well known
5. They are well labeled or branded.
6. They have expiry and manufactured dates shown

7. Their packages have got the same quantities (amounts)

Expiry date: This is the date at which when the drug becomes too old and useless to man.

Manufactured date: This is the date when the drug or a product is manufactured for use.

Advantages of laboratory manufactured drugs

1. They have high purity or clean to use
2. They are well preserved
3. They are well labeled and branded
4. They have the expiry and manufactured debts well shown
5. They are well tested
6. Their effect on human health is well known
7. They are well preserved

Disadvantages of laboratory manufactured drugs

1. They are expensive
2. They can easily cause over dose and poisoning which can result into death
3. They can only work best after following the given prescriptions
4. Some of them are not accessible and affordable.

TRADITIONAL MANUFACTURED DRUGS

These are drugs which are made locally from the available materials from the environment like plant matter, soil and animal materials.

Characteristics of the traditional manufactured drugs

1. They are made from plants (herbs)
2. Their strength, stability and purity change
3. They are different quantities in packages
4. Their effect on human health is not well known
5. They are not labeled and branded
6. They don't have manufactured and expiry dates well shown
7. They lack proper prescriptions

Examples of traditional manufactured drugs

1. Omululuza for malaria

2. Enkejje for measles
3. Ebombo for cough
4. Cough mixture - for malaria
5. Alovera - for malaria
6. Tick berry bush

Advantages of traditional manufactured drugs.

1. They are cheap to acquire
2. They are accessible and available locally
3. They rarely cause over dose
4. They have less side effect on human health when it is used.

Disadvantages of traditional manufactured drugs

1. They are not well labeled and sealed
2. They lack proper prescriptions
3. Their effect on human health is not well known
4. They have low purity
5. They do not have specific package quantities
6. The expiry dates and manufactured dates are not well shown

NB: Some laboratory and traditional drugs are said to be either essential or non-essential drugs.

ESSENTIAL DRUGS

What are essential drugs?

Essential drugs are drugs which are commonly used by people to treat (cure), prevent diseases in people.

Or: Essential drugs are drugs which have got the curative ability

Qualities of essential drugs

1. They are affordable by people

2. They are easy to use
3. They are safe to use
4. They are effective when properly used (They have the curative ability)
5. They are accessible (They are readily available)

Qualities of essential drugs can be easily remembered using the following formula

A S E E A i.e A - Affordable
S - Safe
E - Easy
E - Effective
A - Accessible

Examples of essential drugs

1. Aspirin
2. Panadol
3. Fansidar
4. Chloroquine
5. Quinine
6. Zental
7. Mabendazole
8. Aloevera
9. Enkejje
10. Oral rehydration solution
11. Tick berry bush
12. Cough mixture
13. black jack

NB: All essential drugs are medical drugs because they cure diseases.

Non-essential drugs: These are drugs without curative ability and having negative effect on the human health.

Examples of non-essential drugs

1. Opium
2. Cocaine
3. Marijuana
4. Miraa

Activity:

1. Give two advantages of laboratory manufactured drugs over traditional manufactured drugs.
2. What are essential drugs?
3. Give two qualities of essential drugs.
4. State one advantage of traditional; manufactured drugs,
5. State one danger of taking the drug without the expiry date.
6. List one example of the medical drugs.

7. State one advantage of expiry date put on the drug.
8. Point out two examples of medical drugs against malaria
9. In which way are laboratory manufactured drugs of an advantage to the user?
10. State the drug given against dehydration in children.

DRUG PRESCRIPTIONS

What is drug prescription?

Drug prescription is the written instruction by the health worker to the patient on how to use the drug.

Information given in drug prescription

1. The dosage i.e amount of drugs to take in the specific time i.e 2x3 or 2x1
2. The time when to take the drug
3. The procedures taken before taking before taking the drug i.e take before or after eating food.

Meaning of different prescriptions

2 X 3 - Take two drugs thrice (3 times) in a day. (Take two tablets every after 8 hours)

1 X 3 - Take 1 drug (tablet) thrice in a day. (Take I tablet every after 8 hours)

4 X 2 - Take four tablets twice a day. (Take 4 tablets every after 12 hours)

Advantages or reasons for drug prescription.

1. It prevents the patients from taking over dose or under dose.
2. It prevents during abuse and drug misuse

DRUG ABUSE

What is drug abuse? This is the use of s drug in the way that is harmful to the body.

What is drug misuse: This is the improper use of a drug.

Ways how drugs are or misused by people

1. By taking overdose or under dose.
2. By failing to finish the given dose.
3. By sharing the drugs meant for one patient by more than two patients.

4. Through taking drugs at the wrong time not as required.
5. Through constant depending on the drug after addiction.

What is over dose?

This is an act of taking more drugs than the amount of drugs one is required to take.

Over dose causes drug poisoning to the user which results into death.

What is under dose?

This is an act of taking fewer drugs than the amount of drugs which are required.

Taking under dose makes the germs in the body resistant to the drug and the disease fails to get healed.

Causes of drug abuse or misuse

1. Due to lack of prescriptions on the drugs.
2. For pharmacological reasons like to
   i) Stay awake
   ii) To relieve pain
   iii) To relax their minds
   iv) To bring pleasure
3. Due to peer group influence
4. Some people abuse drugs because they are rejected by their friends (wives or husbands)

Commonly abused drugs in Uganda

1. Alcohol
2. Cocaine
3. Opium
4. Miraa
5) Nicotine
6) Glue and petro
7) Marijuana
8) Heroine

Dangers of buying drugs from local shops and markets

1. Such drugs lack proper prescriptions
2. Such drugs can be expired or already spoiled
3. Such drugs may be poorly stored and already contaminated and spoiled
4. Such drugs may be fake and hence harmful to human health

DRUG DEPENDENCY

Drug dependency is an act of depending on the drug regularly for the normal body functioning.

Drug dependency can result into drug addiction.

What is drug addiction?

Drug addiction is the condition which results from regular depending on the drug for the normal body functioning.

Or: drug addiction is the string desire which result from regular depending on the drug for the normal body functioning.

Examples of common drugs of dependency

1. Cocaine
2. Opium
3. Miraa
4. Marijuana
5. Glue and petrol
6. Heroin
7. Caffein
8. Nicotine

Causes of drug dependency and abuse

- Due to peer group influence
- To be confident
- To relieve pain
- To relax their minds
- Some people depend on drugs to get energy
- To enduce sleep
- To stay awake
- To socialize with others
- To forget their problems

Problems associated with drug dependency and drug abuse

- It causes brain damage and madness
- It can result into respiratory diseases and heart diseases
- It causes self-neglect
- It can cause loss of jobs and friends
- It can lead to divorce
- It causes child abuse and family neglect
- It causes damage to body organs like the liver, lungs, kidney, heart, teeth

- It can lead to school dropouts in case it is practiced by a school going person.
- It causes other anti-social behaviours in the community like rape, theft and defilement
- It can cause poverty and low family and community development.

Ways of avoiding drug dependency

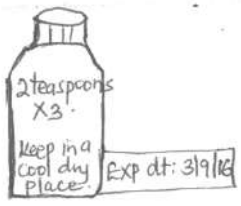
1. By avoiding bad peer groups
2. By joining good social groups like those who don't use drugs
3. By keeping yourself busy during leisure time with sports activities
4. By being a good decision maker.

Ways of proper drug storage

1. By keeping drugs far away from reach of children (to prevent drug poisoning among children)
2. By keeping drugs in the cool dry place to prevent drugs spoilage.
3. By keeping drugs well covered and in the clean dry place to prevent drug contamination.
4. By hanging drugs at higher levels where children can't reach and were moisture can reach.
5. Drugs must be well labeled before they are stored.

Activity:

1. Why should drugs be kept far from reach of children?
2. Point out two drugs which are commonly abused by people in Uganda.
3. State one effect of drug abuse to an individual.
4. Which danger can result from buying drugs from local shops?
5. What is drug abuse?
6. Why should drugs be kept in the clean dry place?
7. What does 2 X 3 mean in drug prescription?
8. Below is a certain syrup which was given to a patient



a) State the importance of the caution put on the above drug.

b) Identify the dosage indicated on the drug.

c) What will be the health problem John will get after taking the drug on 3/09/2016?

d) Which advice can you give to Joseph who drug abuse?

9. What is drug prescription?
10. Give two reasons why drug prescription is important to the drug user.
11. Identify the condition that can result from drug dependency.
12. List two life skills one should have in order to avoid drug dependency.
13. State the effect that can result from taking over dose.

THE CIRCULATORY SYSTEM

What is the circulatory system?

Circulatory system is the body system that is responsible for the transportation of blood in the body.

What are circulatory organs?

These are body organs responsible for the transportation of blood in the body.

What is circulation?

This refers to the transportation of blood in the body.

Components of the circulatory system

1. Heart
2. Blood
3. Blood vessels

THE MAMMALIAN HEART

The heart: This is the muscular pumping organ of the body.

The main function of the heart is to pump blood to all body parts.

- The heart is located in the chest cavity under the left lungs.
- The heart is protected by the ribcage.

Chambers of the heart

1. Right atrium (auricle)
2. Left atrium (auricle)
3. Right ventricle
4. Left ventricle

NB: The upper chambers of the heart are called atria or auricles.

- The lower chambers of the heart are called ventricles
- Muscles of the heart are called cardiac muscles.

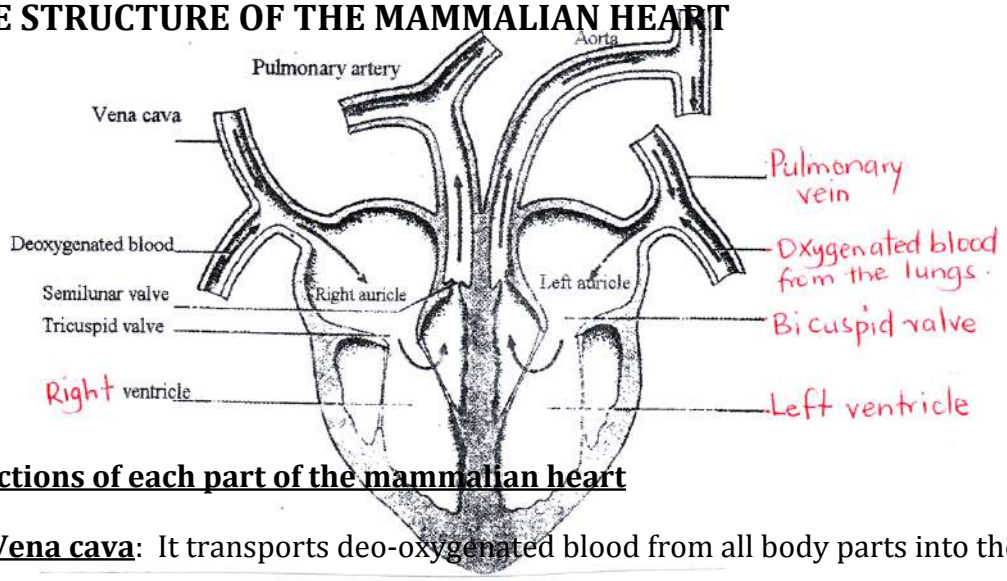
- The left cardiac muscles of the heart are thick walled compared to the right side.

Reason:

Left cardiac muscles pump oxygenate blood at a greater pressure to all body parts.

The right cardiac muscles of the heart are thin walled because they pump de-oxygenated blood that flows at a low pressure through a shorter distance to lungs.

THE STRUCTURE OF THE MAMMALIAN HEART



Functions of each part of the mammalian heart

1. **Vena cava**: It transports deo-oxygenated blood from all body parts into the heart.
2. **Pulmonary artery**: It transports de-oxygenated blood from the heart to lungs to be oxygenated.

   Blood is pumped to the lungs to drop carbondioxide and pick oxygen from the lungs. (for oxygenation)
3. **Pulmonary vein**: It transports oxygenated blood from the lungs into the heart.
4. **Aorta:** It transports oxygenated blood from the heart to all body parts.
5. **Septum**: It is the thick muscle that separates the heart into two sides i.e the left side and the right side.
6. **Valves**: It prevents the backward flow of blood in the heart.

NB: The heart is suitable for pumping blood because it is muscular for pumping blood.

TYPES OF VALVES

1. Bicuspid valves
2. Tricuspid valves
3. Pulmonary valves
4. Coronary valves

Note the following

- The heart beat of a normal person is 72 times per minute.
- The heart beat increases when one is doing vigorous exercise because the heart pumps more oxygenated blood to the body cells.
- Blood is first pumped to the lungs before it is pumped to all body parts in order to drop carbondioxide and pick oxygen or to be oxygenated.
- The doctor uses the stethoscope to listen to the heart beat.
- The doctor uses the instrument called sphygmomanometer to measure the blood pressure.
- The scientist who discovered blood circulation was Sir William Harvey.
- The general name given to all the blood vessels that carry blood away from the heart are arteries.
- The biggest vein in the body is called the venacava.
- The biggest artery in the human body is called the Aorta.

Activity:

1. State the main function of the heart in the body.
2. How do we call the transporting system of the body?
3. Where is the heart located in the body of a dog?
4. State the importance of valves in the human heart.
5. How many chambers has the human heart?
6. State the normal heart beat of a person.
7. Why is the left cardiac muscles of the heart thick walled?
8. Which part of the skeleton protects the heart?
9. How do we call the muscles of the heart?
10. Why is blood pumped to the lungs before it is pumped to all body parts by the heart?
11. What name is given to the blood vessels that carry blood into the heart?
12. Which type of blood is carried by the pulmonary artery?
13. State the chief organ of the circulatory system.

HOW THE HEART WORKS

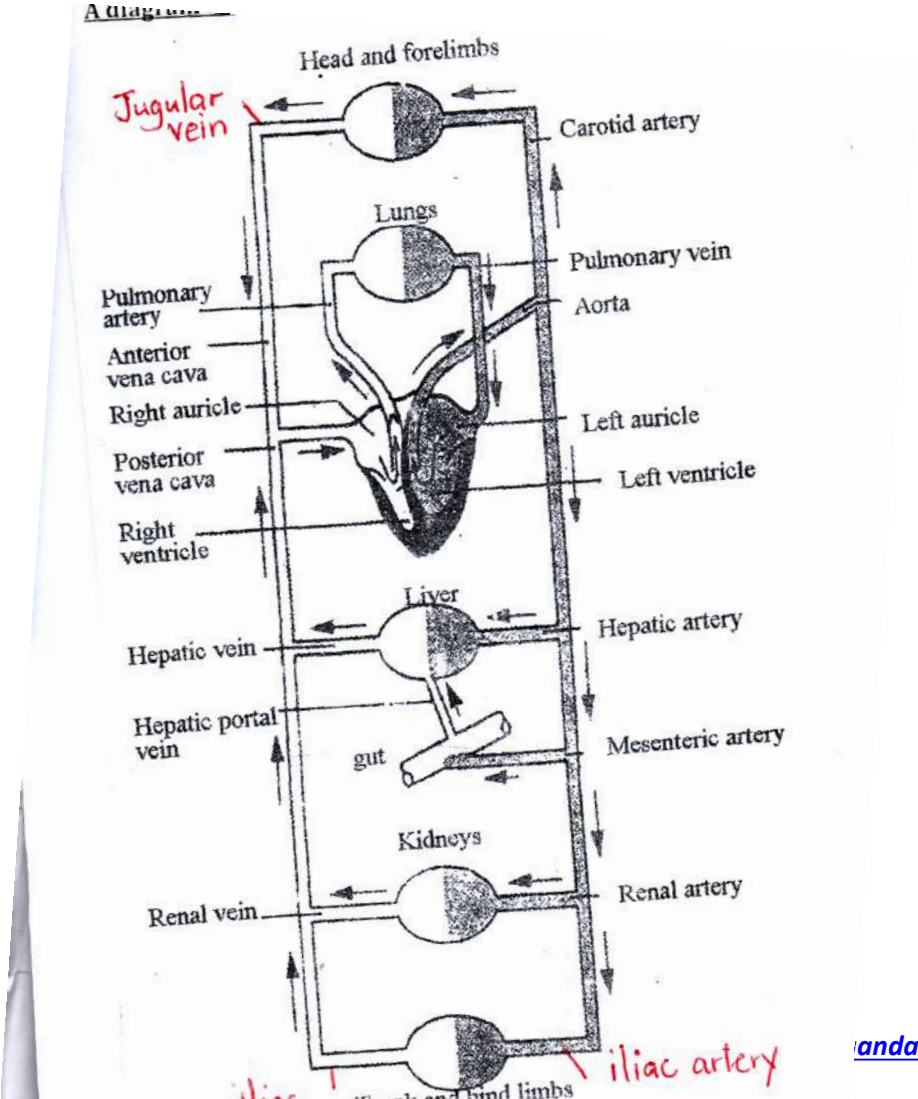
- The heart works by contraction of the cardiac muscles.
- Contraction of the heart muscles is called systole.
- Relaxation of the heart muscles is called Diastole.

- When the heart muscles relaxes, blood is allowed to enter the heart and when the heart.

DOUBLE CIRCULATION

Double circulation is the movement of blood twice in the heart before it is pumped to all body parts.

A diagram showing circulation of blood in the body



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BODY ORGANS CONNECTED TO BLOOD CIRCULATION

1. **Heart**:
   - It pumps blood to all body parts.
   - The heart is supplied with blood by the coronary artery and coronary vein.
2. **Lungs**:
   - It helps to oxygenate blood during blood circulation.
   - Lungs are supplied with blood by the pulmonary artery and the pulmonary vein.
   -
3. **Brain**:
   - The brain controls the heart beat.
   - It sends the messages to the kidney to regulate the amount of salts and water in the body.
   - The brain is supplied with blood by the carotid and carotid vein.
4. **Kidney**:
   - It helps in detoxication of harmful substances in blood.
   - The liver is supplied with blood by the hepatic vein and the hepatic artery.
   - Hepatic portal vein supplies digested food from the ileum to the liver.
5. **Intestines**
   - They supply digested food in the blood.
   - The intestines are supplied with blood by the mesenteric artery and the hepatic portal vein.

BLOOD VESSELS

A blood vessel is the tube running from the heart to all body parts transporting blood.
Or Tubular structures through which blood flows.

TYPES OF BLOOD VESSELS

1. Arteries
2. Veins
3. Blood capillaries

AN ARTERY

- Arteries transport oxygenated blood apart from the pulmonary artery that transports de-oxygenated blood.
- Arteries transport blood away from the heart.

Structure of an artery



Characteristics of arteries

1. They transport blood which flows at a greater pressure.
2. They have got narrow lumen (blood passage)
3. They have thick walls.
4. They don't have valves
5. They transport blood that flows a greater pressure
6. Arteries transport blood away from the heart.

   Or they transport oxygenated blood apart from the pulmonary artery.

NB: Arteries do not have valves because they carry blood which flows at a greater pressure which can't easily flow backwards.

Arteries have got thick walls because they transport oxygenated blood which has got a greater pressure.

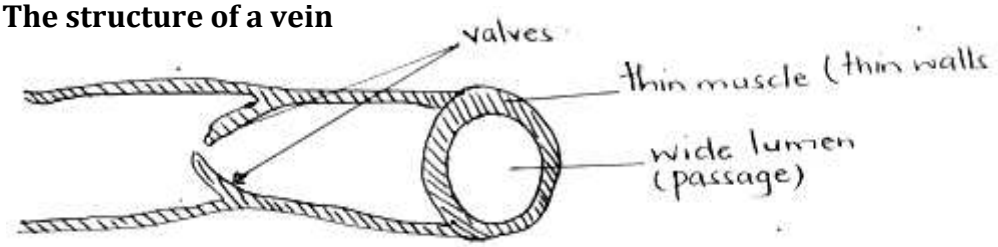
Thick walls are able to withstand the greater pressure of the oxygenated blood that flows through them.

VEINS

Veins transport de-oxygenated blood apart from the pulmonary vein which transports the oxygenated blood.

All veins transport blood into or towards the heart.

The structure of a vein



Characteristics of veins

1. They have valves
2. They have wide lumen
3. They have their walls
4. Veins transport or carry blood into the heart
5. They transport blood that flows at a low pressure
6. Veins transport de-oxgyenated blood apart from the pulmonary vein

NB: veins have got valves because they transport blood that flows at a low pressure which can easily flow backwards.

- Valves help to prevent the backward flow blood in the veins.
- Veins have got thin walls because they carry de-oxgyenated blood that flows at a low pressure through them.
- The biggest artery in the blood is an Aorta.
- The biggest vein in the body is the Venacava.

Structural differences between arteries and veins.

Arteries	**Veins**
1. Have thick walls 2. Have narrow lumen 3. Have no valves	1. Have thin walls 2. Have a wide lumen 3. Have got valves

NB: The functional difference between arteries and veins is:
Arteries carry blood away from the heart while veins transport blood towards (into) the heart.

BLOOD CAPILLARIES

- Blood capillaries are the smallest blood vessels in the body.
- It joins arteries to veins
- They transport both oxygenated blood and de-oxygenated blood.
- The exchange of materials occur in blood capillaries.

Structure of blood capillary

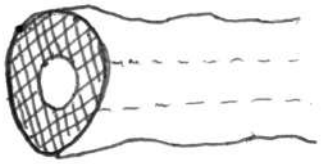


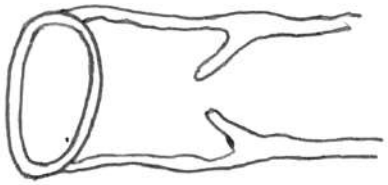
Blood capillaries allow exchange of materials in blood like oxygen, carbondioxide, food and mineral salts.

Blood capillaries allow exchange of materials because they are thin walled to allow easy diffusion of materials.

Activity:
1. Point out two structural differences between arteries and veins.
2. How are valves useful in the veins?

3. State the general name given to the blood vessels that carry blood towards the heart.
4. Below are two blood vessels.





   a) Name the blood vessel marked i) A _____ ii) B _____
   b) Which type of blood is transported by blood vessel i) A _____ ii) B _____
5. Why don't arteries possess valves?
6. Which blood vessel supplies digested food to the liver?
7. Identify the general name given to the blood vessels that supplies blood to the kidney.
8. Why is the kidney useful in blood circulation?
9. State the role played by lungs in blood circulation.
10. How is the heart adapted to its function?
11. State the smallest blood vessel in the body.
12. How are blood capillaries suitable for exchange of materials?

BLOOD

- Blood is the red liquid that flows in the body of the animals.
- Blood flows in the body through the blood vessels.
- Blood is formed in the body by the mineral salt called iron.
- Blood is red in colour because it contains the haemoglobin.

COMPONENTS OF BLOOD

There are four components of blood namely:

i) White blood cells (leucoctes/white corpuscles)
ii) Red blood cells (erythrocytes/red corpuscles)
iii) Plasma
iv) Blood platelets (thrombocyetes)

WHITE BLOOD CELLS (Leucocytes)
These are colourless blood cell with the nucleus.
The main function of white blood cells is to defend the body against infections or diseases.
There are two type of white blood cells i.e
i) Lymphocytes : They produce antibodies against diseases causing germs.
ii) Phagocytes: They swallow up the foreign bodies such as bacteria to control infections.
White blood cells are manufactured in the yellow bone marrow of long bones and the lymph nodes or spleen.
White blood cells also help to make antibodies.

<u>Characteristics of white blood cells</u>

1. They have got a nucleus.

2. They have got the irregular shape.
3. They are bigger than red blood cells

Ways how white blood cells defend the body against infections.

1. By producing antibodies against diseases causing germs.
2. By ingesting the bacteria and dead cells through engulfing and digesting them.

- White blood cells are able to kill germs by engulfing them because they are irregular in shape.
- Being irregular in shape they are able to diffuse or pass through walls of the blood capillaries easily to invade the germs.

What are antibodies?

These are chemical substances found in the blood plasma that are produced by the white blood cells to defend the body against germs and toxins.

RED BLOOD CELLS (Erythrocytes)

These are disc shaped cells without a nucleus.
The main function of red blood cells is to transport oxygen in the body.
Red blood cells are manufactured in the red bone marrows of short bones like ribs, scapula sternum, pelvis vertebrae

Functions of red blood cells.

1. It transports oxygen in the body
2. It transports small amounts of carbondioxide
   - Red blood cells contain the haemoglobin

What is haemoglobin?

Haemoglobin is the red pigment found in the cytoplasm of the red blood cells.

Importance of haemoglobin

1. It transports oxygen in the body
2. It gives blood red colour

- When haemoglobin combines with oxygen to form oxy-haemoglobin but it combines with carbondioxide to form carboxy-haemoglobin.

Structure of the red blood cell



Characteristics of red blood cells.

1. It has no nucleus
2. It has a disc shape (regular shape)
   - They are smaller than the white blood cells.

The mineral salt that is responsible for the formation of red blood cells is iron.

NB: Red blood cells are affected by the plasmodia germ.

- White blood cells are affected by HIV (Human Immuno-deficiency Virus)

Differences between the white blood cells and red blood cells

White blood cells	**Red blood cells**
1. They have got a nucleus. 2. They have an irregular shape. 3. They are bigger than red blood cells. 4. They defend the body against infections.	1. They have no nucleus 2. They have a disc shape 3. They are smaller than white blood cells. 4. They transport oxygen in the body.

BLOOD PLASMA

This is the liquid part of blood. It is 90% water.

Blood plasma is the largest component of blood.

Components of blood plasma.

- Digested food
- Urea
- Hormones e.g insulin, adrenalin
- Blood cells
- Carbon-dioxide
- Glucose
- Amino acids
- Proteins
- Water

Importance of the blood plasma

1. It transports digested food in the body.
2. It transports heat in the body.
3. It transports hormones from glands to areas of target.
4. It transports excretory products from body cells to the excretory organs
5. It transports medicine to the areas of target
6. It transports carbon-dioxide from the body cells.

BLOOD PLATELETS

- It is formed from the red bone marrows

- Blood platelets help to carryout blood clotting in case of a wound in order to prevent loss of blood (bleeding)
- Blood platelets control loss of blood forming a blood clot blanket on the wound to stop bleeding.
- Foods rich in vitamin K help in the formation of blood platelets e.g cabbages.
- Lack of vitamin K causes poor blood clotting (Haemophilia)

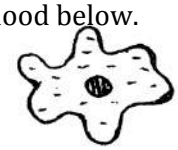
FUNCTIONS OF BLOOD IN THE BODY

1. Blood transports digested food in the body.
2. Blood transports waste products from the body cells to excretory organs.
3. Blood transports oxygen in the body.
4. Blood transports heat in the body and regulates the body temperature by distributing heat in the body.
5. Blood defends the body against infections
6. Blood transports hormones from glands to the areas of target.
7. Blood transports antibodies and other blood cells in the body.
8. Blood transports medicine in the body to resist against diseases.
9. Blood provides through which all chemical reactions take place in the body like respiration.
10. Blood transports oxygen from lungs to body tissue.

Activity:

1. State one structural difference between arteries and veins.
2. Which disease whose germs affect the white blood cells?
3. Identify the blood vessel that transports digested food from the intestines to the liver.
4. Which component of blood is attacked and destroyed by malaria parasite?
5. Write HIV in full.
6. Identify the components of blood below.





i) _____ ii) _____

7. Point out one functional difference between white blood cells and red cells.
8. State the liquid or watery part of blood.
9. Of what role does haemoglobin play in the body?
10. Apart from oxygen, state any other products transported by red blood cells.
11. List two components of blood plasma.

12. How does blood platelets control bleeding in flesh wounds?
13. Which disease can result from lack of enough red blood cells in the body?
14. Point out two functions of blood in body of a pig.
15. Identify one characteristic you can use to identify a white blood cell.

BLOOD GROUPS

The amount of blood in the human body ranges from 5-6 litres.

But the blood capacity falls if someone becomes anaemic.

Types of blood groups

1. Blood group O (Universal donor)
2. Blood group A
3. Blood group B
4. Blood group AB (Universal acceptor

Blood Transfusion

This is the transfer of screened blood from one person to another as long as blood groups agree.

Blood donor:

This is a person who gives healthy blood to another person.

Blood recipient (Receiver)

This is the person who receives screened blood from another person.

A table showing the blood groups and how donation of blood can be done

Blood	Can give blood to	Can receive blood from
i) A	A and AB	A and O
ii) B	B and AB	B and O
iii) AB	AB only	All groups i.e A, B, Ab, O (universal acceptor)
iv) O	All groups (universal donor)	O only

Universal donor

Blood group O is a universal donor because they can donate blood to all other people of different blood groups.

Blood transfusions can only be given to people of compatible blood groups whose blood can mix without agglutination of the red blood cells.

Universal acceptor (recipient)

This is blood group AB which can accept blood transfusion without agglutination of red blood cells from all other blood groups.

Blood donation organization

1. Nakasero blood bank

Diseases of the circulatory system (heart)

1. Malaria
2. HIV/AIDS
3. Sickle cell anaemia
4. Haemophilia
5. Leukemia (Blood cancer)
6. High blood pressure and low blood pressure
7. Coronary heart disease
8. Heart stroke
9. Anaemia
10. Heart failure

MALARIA

Malaria is spread by an infected female anopheles mosquito and it is caused by a plasmodium germ.

A plasmodium is introduced in the body of a person through mosquito bite.

Plasmodia germs attack and destroy the red blood cells which will cause reduction on the number of iron and red blood cells resulting into anaemia.

Malaria can also be spread through blood transfusion.

HIV/AIDS

HIV in full is Human Immuno-deficiency Virus

AIDS - Acquired Immune Deficiency Syndrome

AIDS is caused by a virus called Human Immuno-deficiency Virus.

HIV attacks and destroys the white blood cells which weakens the body's immunity.

It makes the white blood cells in active hence making the body vulnerable to infections.

HOW HIV/AIDS IS SPREAD

- Through having unprotected sex with an infected person.
- Through blood transfusion during accidents.
- From the infected mother to the newly born baby through transfusion at birth and during breast feeding.
- Through sharing un sterilized sharp piercing and cutting objects with an infected person like razor blade, needles, safety pins e.t.c

Signs and symptoms of HIV/AIDS

1. Chronic dry cough
2. Persistent fever
3. Skin rashes which causes itching skin
4. Tuberculosis
5. Lung infection
6. Severe diarrhoea
7. Herpes zoster (Kisipi)
8. Loss of hair on the head
9. Red lips

10. Severe body weakness
11. Loss of body weight in a short time

Body fluids through which HIV/AIDS can be spread.

1. Blood
2. Semens seminal fluids
3. Vaginal fluids

NB: HIV/AIDS is a sexual transmitted disease (STD)

STDs in full: Sexual transmitted Diseases.

STDs are disease which can be spread through playing un protected sex with the infected person.

Examples of STDs

1. HIV/AIDS
2. Syphiis
3. Gonorrhoea
4. Genital herpes
5. Genital warts
6. Chancroid

Ways how HIV/AIDs can be controlled.

1. Through abstaining from pre-marital sex
2. Through using condoms during sex intercourse
3. Through avoiding sharing un sterilized sharp piercing objects

   ABC in full in the control of STDs

   A - Abstaining from Sex

   B - Being faithful to your partner

   C - Condom

ANAEMIA

- It is caused by lack of iron in blood or lack of red blood cells.
- It causes severe weakness of the body.
- The body with anaemia will have less red cells and un able to carry out respiration hence making the body weak.
- It can be also caused by malaria infection.

Ways of controlling anaemia

1. Through blood transfusion
2. Through eating food rich in iron like liver, green leafy vegetables, fish, meat, chicken, peas, beans etc

SICKLE CELL ANAEMIA

This is the condition when one's red blood cells become sickle shaped.

Sickle cell is an hereditary disease.

The sickle celled red blood cells block the blood vessels preventing the normal flow of blood.

Sickle cells can cause loss of body weight and body weakness.

LEUKEMIA (Blood cancer)

- It is also called blood cancer.
- It is caused by the abnormal growth of white blood cells
- It makes the number of white blood cells become very low
- Leukemia has no cure

HAEMOPHILIA

- It is an hereditary disease
- It is also deficiency disease that is caused by lack of vitamin K in our diet.
- It causes continuous bleeding in case of a wound.
- This disease results from having few blood platelets.
- Haemophilia can be controlled through eating foods containing vitamin K.

HIGH BLOOD PRESSURE (Hyper tension)

This is caused by the narrowing of the blood vessels which makes the heart use more force to pump blood through them.

It is caused by eating a lot of fatty and sugary foods.

High blood pressure is also associated with many other heart diseases that involves the formation of blood clots in the blood vessels which restricts the flow of blood.

Control of high blood pressure

1. Avoid eating too much fatty sugary foods
2. Avoid alcoholism
3. Performing regular physical exercise.

Ways of promoting the proper functioning of the

1. Through performing physical exercises
2. Through eating foods containing a balanced diet
3. Through eating too much fatty and sugary foods
4. By avoiding alcoholism and smoking habit

NB: Physical exercises promote the proper working of the heart (circulatory system) because they strengthen the heart muscles.

Advantages of physical exercises

1. They promote the proper functioning of the circulatory system by strengthening the heart muscles.
2. They promote physical or body fitness
3. They reduce the body fats.
4. They refresh the people's minds
5. They reduce the risks of suffering from heart diseases.

Disorders of the circulatory system

1. Blockage of the arteries
2. Poor blood clotting
3. Defective valves
4. High blood pressure and low blood pressure

RESPIRATORY SYSTEM

Respiration is the system concerned with taking in of oxygen and releasing of energy by the body tissues.
Respiration is the process by which food is broken down in the body cells to release energy.
Respiration takes place or occurs in body cells in a part of a cell called mitochondria.

The man product of respiration is energy.

By products

- Water vapour
- Carbondioxide

Types of respiration

- Anaerobic respiration
- Aerobic respiration

Anaerobic respiration: This is the type of respiration where oxygen is not needed to release energy.
It takes place in muscles during vigorous exercise.

Aerobic respiration: This is the type of respiration where oxygen is used to release energy.

NB: During respiration oxygen is used to burn food.

Breathing: This is the taking in and out of air or the constant exchange of gases between the living organisms and the environment.

Organs related to respiration

- Lungs -Trachea (wind pipe)

- Nose - diaphragm

Types of breathing

- Inspiration or inhalation
- Expiration or exhalation

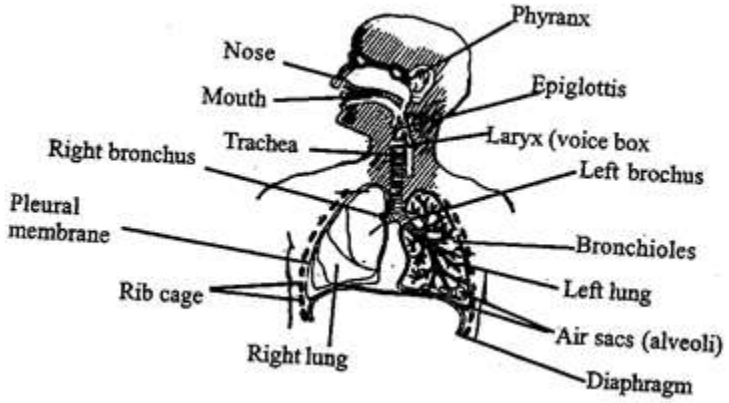
Inhalation : This is the taking in of air.

Exhalation: This is the taking out of air.

The lungs

- The lungs are pinkish in colour and located on either side of the chest.
- The lungs are protected by the ribcage.
- The lungs are surrounded by a membrane called pleural membrane which secrets pleural fluid.
- The pleural membrane which secrets pleural fluid. The pleural fluid reduces friction between the ribs and the lungs. The intercostals muscles help to hold the ribs together.
- The diaphragm is the sheet of muscles which separates the chest cavity from the abdominal cavity.

The diagram of a respiratory system



Functions of different parts of the respiratory system

Nose

It contains mucus and tiny hairs called Cilia. Cilia and mucus trap dirt and other foreign bodies which enter the nose.

When air enters the nose, it is cleaned (filtered), warmed and moistened. It isn't advisable for one to breathe through the mouth because air in the mouth will not be warmed / cleaned.

Trachea

It is also called the wind pipe.

It is also called a tube through which air is drawn into the lungs.

This trachea is made up of rings of cartilage which keep the trachea open throughout.

Epiglottis

- The epiglottis is a flap which covers the opening of the trachea.
- The epiglottis prevents food particles from entering the wind pipe which may cause choking.
- Inside the trachea are tiny sensitive hairs called cilia which trap foreign bodies from entering the trachea which cause coughing.

Bronchus

- It is a branch of the trachea leading to a lung.
- Each bronchus also divides into bronchioles. Bronchioles are also divided into tiny Air sacs or Alveoli.
- There are about 300 million air sacs in each lung.

Gaseous exchange. It takes place in the air sacs

Voice box (Larynx)

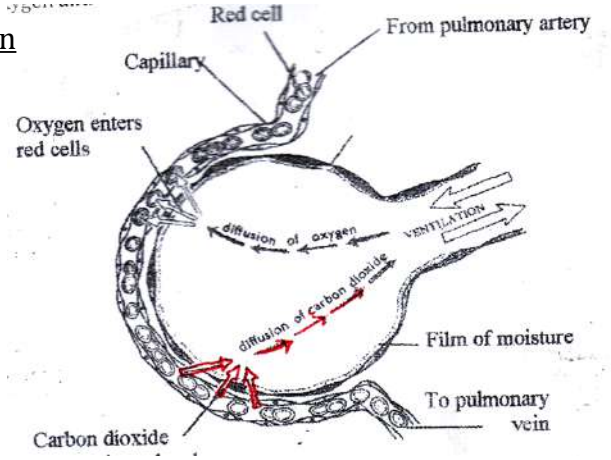
The larynx is made up of two chords.

These vocal chords vibrate when air passes over them. The sound produced in the voice box can be guided by the teeth, palate, lips and

Geseous exchange in the alveolus

Oxygen and carbondioxide pass through the air sacs by the process of diffusion.

Illustration



Adaptation of the alveoli (air sacs) to gaseous exchange.

1. Air sacs have thin walls to allow easy diffusion of gases.
2. Air sacs are surrounded by a dance network of blood capillaries which supply them with blood.
3. Air sacs are numerous to increase the surface area for diffusion of gases.

4. The lining of the air sacs is made up of a film of moisture which makes trapping of gases easy.

What happens to the following body organs during inhalation?

1. Lungs: They expand to allow in air.
2. Ribs: They move upwards and outwards.
3. Diaphragm: It contracts and goes downwards.
4. Intercostal muscles: They contract pulling the ribs upwards and outwards.
5. Chest cavity: The volume of the chest increases.

What happens to the following organs during exhalation?

1. Lungs: They relax and decrease in volume
   Or: Lungs go back to their original size.
2. Diaphragm: the diaphragm relaxes and returns to a domed shape.
3. Ribs: They move downwards and inwards.
4. Chest cavity: The volume of the chest deceases.
5. Intercostal muscles: The intercostal muscles relax.

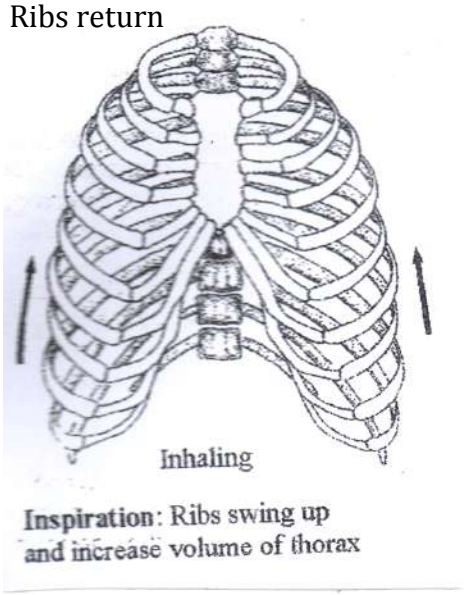
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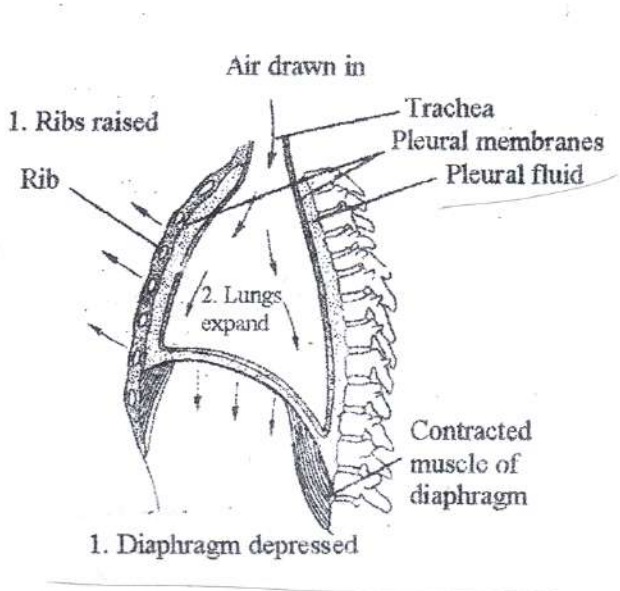
During inhalation

Ribs raised

During exhalation

Ribs return

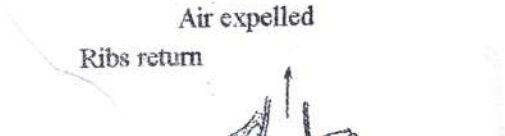




During exhalation

Ribs return





Factors that affect the breathing rate and heart beat

- Fright
- prolonged hunger
- Sickness
- Doing vigorous exercise
- Excitement
- Shocking news

A stethoscope is used to determine the breathing rate and heartbeat.

Why does the breathing rate and heart beat increase when someone is scared or.

They increase the heart pumps more blood containing food and oxygen in the body muscles to release energy.

Comparison of air breathes in and out.

Type of air	Inspiration	Expiration
Oxygen	21%	16%
Carbondixide	0.03%	4%
Nitrogen	78%	78%
Water vapour	less	more

a) Explain why there was a change between inspired oxygen and expired oxygen.
Expired oxygen reduced because the body uses oxygen during expiration.

b) Why did expired carbondioxide increase?
It increases because the body produced more carbondioxide during respiration.

c) Explain why nitrogen has no change between inspired and expired air.
Nitrogen is neither used in the body nor produced during respiration.

d) Why was there more expired water vapour?
The water vapour increases because the body produced more water vapour during respiration.

Diseases of the respiratory system.

a) Non-infectious diseases of the respiratory system.

- Lung cancer
- Bronchitis
- Emphysema
- Asthma

} pertussis

b) Infectious/communicable diseases of the respiratory system

- Whooping cough (pertussis)
- Diphtheria
- Tuberculosis
- Influenza
- Pneumonia

Tuberculosis

Tuberculosis is caused by bacterium called mycobacterium. It is spread from one person to another through air. It easily spreads in overcrowded or poorly ventilated areas.

Signs and symptoms of tuberculosis

- Prolonged fever
- Severe sweating at night
- Loss of body weight
- Persistent dry cough

Prevention and control of tuberculosis

- Through immunizing children at birth using BCG vaccine.
- Isolate infected people from the healthy ones
- Seek treatment early

Diphtheria

Diphtheria is caused by bacteria. It is air-borne.

Signs and symptoms of diphtheria

- Sore throat
- Swollen neck
- Difficulty in breathing

Control and prevention of diphtheria

- Through immunizing children against diphtheria using DPT vaccine.
- Isolation of infected people

Whooping cough (pertussis)

It is caused by bacteria. It spreads from one person to another through air.

Signs and symptoms of diphtheria

- Running nose
- Severe cough with spells
- Deep breaths through the mouth

Prevention and control

- Isolating infected people
- Immunising children against pertussis using DPT vaccine

Lung Cancer

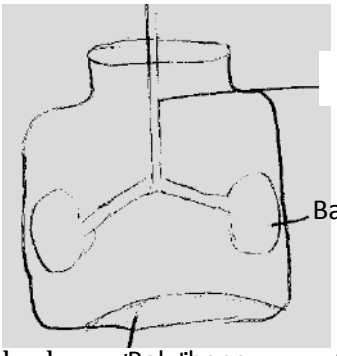
Lung cancer is a non-infectious disease. Lung cancer is caused by smoking. It is caused by a substance in tobacco called tar.

It leads to abnormal growth of cells in lungs.

Prevention and control

- Avoid smoking
- Infected people should seek treatment early

Study the diagram and answer the questions.



Q. Which body system is represented in the diagram above?

The respiratory system

Q. What does the following parts represent?

a) Glass tube – trachea

b) Balloon – Lungs

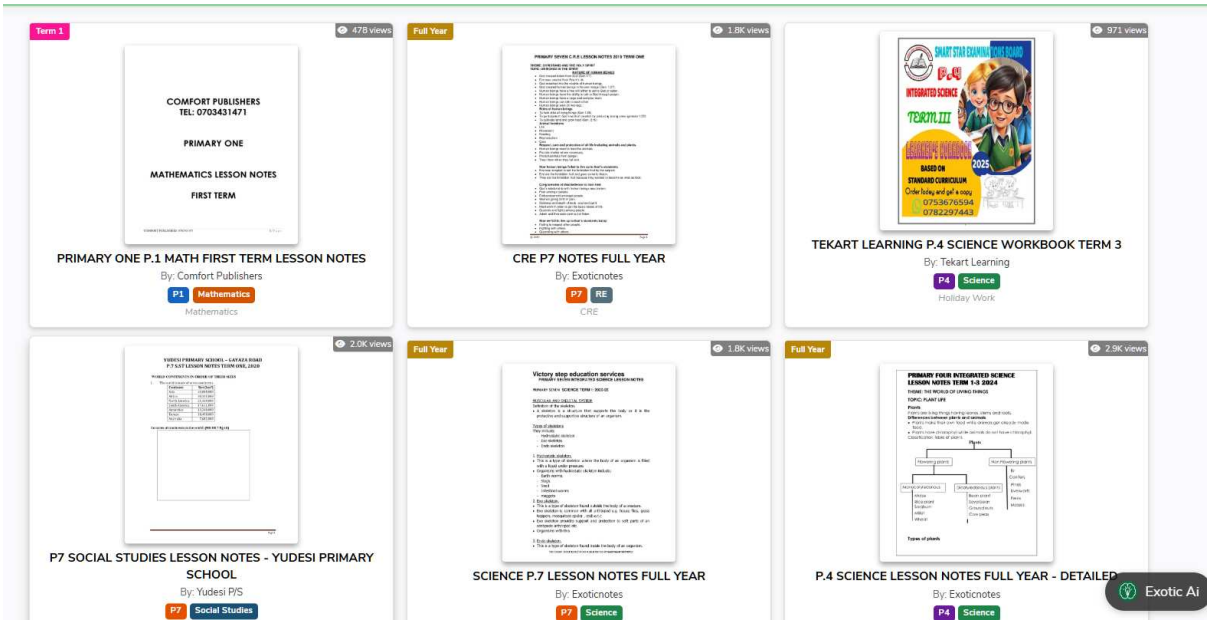
c) Polythene paper – diaphragm

Q. Mention one disorder of the respiratory system.

A. Choking

Polythen paper

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