Ministry of Education

Eliminating Illiteracy, Modernizing Education, Strengthening Tolerance

SCIENCE

Grade Five

Term 1



TOPIC: Human Body

SUB-TOPIC: The Effects of Exercise on Heart Beat Rate

The Circulatory system allows blood to be carried completely around the body, in one minute.

Parts of the Circulatory System

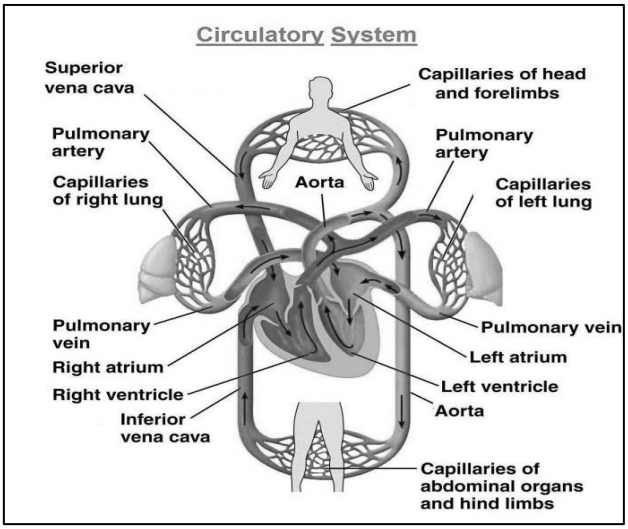
The parts that help to make up the circulatory system are:

- Heart
- Arteries
- Veins
- Capillaries

Blood flows through three tubes called blood vessels.

Arteries, veins and capillaries are blood vessels.

The main organ of this system is the **heart.** It is made up of the **cardiac muscles.**



How the Circulatory System Works

- The heart pumps blood around the body.
- The arteries take the blood enriched with oxygen from the lungs to all parts of the body.
- Nutrients from the food we eat are also taken by the blood to all the parts of the body.
- The nutrients, oxygen and water pass through the thin walls of the capillaries.
- The veins take blood containing carbon dioxide, produced in the body, back to the heart.
- The heart pumps this blood to the lungs where the carbon dioxide is breathed out.

The Effects of Exercise on the Heart Rate

- In children, the heart beats about 100 to 120 times in one minute.
- In adults, the heart beats about 70 to 90 times in one minute.
- When we exercise the heart beats stronger and faster.
- The cells of our muscles need extra food and oxygen when we exercise.
- Hence the heart must beat faster and harder to take more blood with food and oxygen to the muscles.

The Effects of Smoking on the Circulatory System

- Smoking increases the heart rate.
- It narrows blood vessels in the skin resulting in a drop in skin temperature.
- When persons smoke their blood pressure rises.
- Smoking causes less oxygen to be carried by the blood during exercise.

How smoking affects the circulatory system

• Chemicals absorbed from cigarette smoke cause constriction of vital arteries; this causes the heart to work harder to pump blood through the body

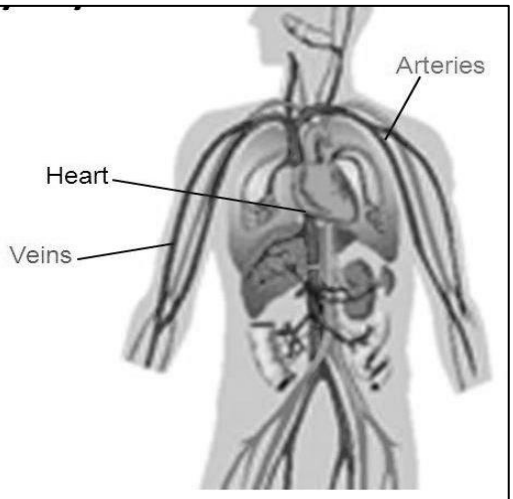
•There is an increase in heart rate and blood pressure

• Less oxygen carried by the blood to vital organs

•Reduced blood flow to extremities like fingers and toes

•Thicker blood, which is more prone to clotting

•Increased risk of stroke and heart attack due to blockages of the blood supply



ON YOUR OWN

1. Which system is responsible for the circulation of blood?

   _____

2. The _____ is the main organ in the circulatory system.
3. Arteries, vein and capillaries are all known as _____.
4. What is one effect of smoking on the circulatory system?

   _____

5. State one effect of exercise on the heart rate of the body.

   _____

SUB-TOPIC: Benefits of Exercising Regularly

Exercise is a specifically planned and organized session of physical activity that you do to improve and maintain your physical fitness.

It should be done in three stages: warm-up, work out and cool down.

Warm-up is for a period of ten minutes.

- During this period, the heart beat rate gradually increases and your body temperature starts to rise.
- Muscles become more flexible as the flow of blood increases.
- Exercise helps us to have healthy body and mind.
- It helps you to look good by having a well sculptured body.

Kinds of Exercise

The two kinds of exercises are aerobic exercise and anaerobic exercise.

- Aerobic exercise targets the whole body, increases the heart beat rate and includes the use of oxygen.
- Some examples of aerobic exercises are swimming, brisk walking and cycling.
- Anaerobic exercise helps to build lean muscle mass.
- It strengthens the heart, lungs and bones.
- Anaerobic exercise helps your body conserve some nutrients and aid digestion.
- Some examples of anaerobic exercises are body building, sprint and weight training.

Benefits of Exercising Regularly

- Help persons to feel less stressed.
- Persons feel better about themselves
- Persons keep a healthy weight.
- It helps to build and strengthen healthy bones, muscles and joints of persons.
- Help persons to sleep better at night.
- Help to reduce the risk of heart diseases.
- Help keep your thinking and learning skills sharp as your age.
- Reduce your risk of some cancers.
- Increase your chances of living longer.

ON YOUR OWN

1. In your own words, define the term exercise.

   _____

   _____

2. State the names of the kinds of exercise.

   _____

3. Give two examples of Aerobic Exercise.

   _____

4. Give two examples of anaerobic exercise.

   _____

5. Give one difference between the two kinds of exercise.

   _____

6. State two benefits of exercise to the human body.

   _____

   _____

SUB-TOPIC: Effects of High Fat Diets

Fats are compounds that can be solid or liquid at room temperature.

Fats usually contain only three elements. These elements are:

- Hydrogen
- Carbon and
- Oxygen

Functions of Fat

Fats help the body:

- Stockpile certain nutrients. The so-called fat soluble vitamins A, D, E and K are stored in the liver and in fatty tissues.
- Store energy
- Protect us and our vital organs.
- Act as messengers, helping proteins do their jobs.

Fats supply energy to the body.

Fats are richer in energy than carbohydrates.

Fats can be sourced from both plants and animals.

Animal fats contain cholesterol.

Doctors believe that cholesterol is involved in forming deposits inside the blood vessels. This results in poor blood circulation and sometimes heart attacks or strokes. For this reason many doctors prescribe diets low in cholesterol.

When a person eats more fats than the body can use, the excess is stored as body fat.

Body fat occurs mainly under the skin and also around many internal organs.

If too much fat is stored around the heart, it puts pressure on it causing it to slow down the process of the heartbeat. This can result in periods of heart attacks.

Too much fat in the body can have negative effects which include:

- Weight Gain
- Constipation
- Heart Disease
- Slow Metabolism
- Obesity
- High Blood Pressure
- Uncontrolled Diabetes

ON YOUR OWN

1. Define the term fats.

   _____

2. Name two elements that can be found in fats.

   _____

3. State one function of fats in the human body.

   _____

4. State two sources of fats.

   _____

5. What are two effects of diets that are high in fats?

   _____

   _____

SUB-TOPIC: Wastes of the Body

Our body produces waste in the form of solids, liquids and gas.

Solid waste is composed of the parts of food that cannot be digested.

Liquid and gaseous wastes are by-products of activities of the body cells.

Some body wastes include:

- Carbon dioxide
- Urine
- Perspiration
- Faeces
- Tears
- Dead Cells (inflammation)

Cells of our bodies carry out many activities which involve the use of various substances and production of wastes. The giving off or removal of wastes is called **excretion**.

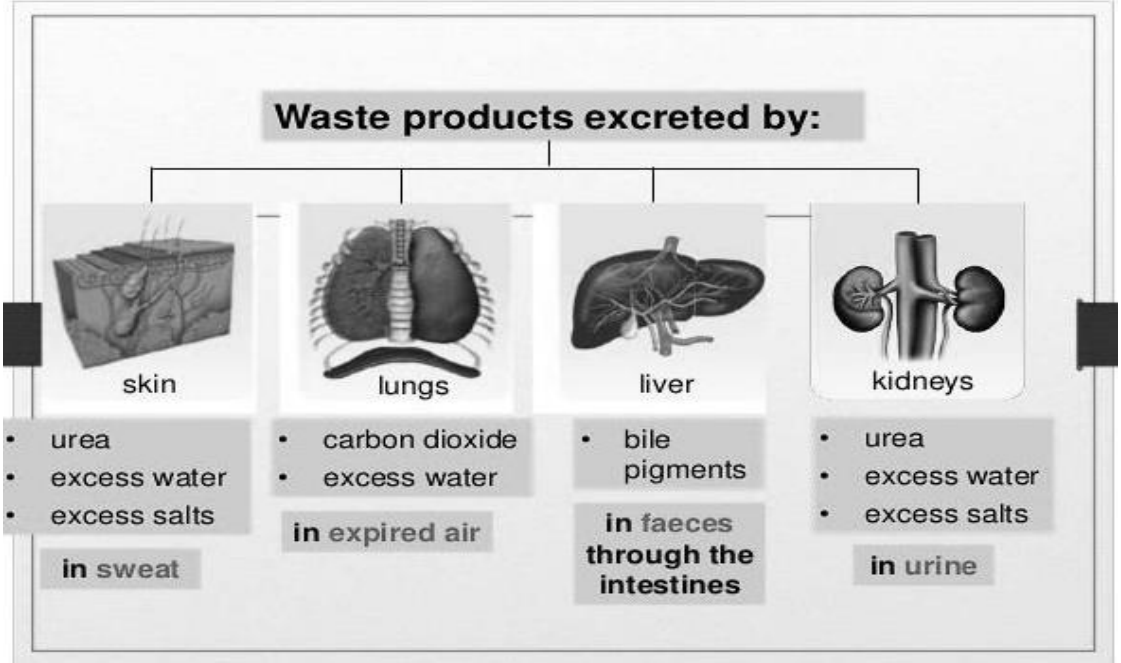
The blood collects waste products from cells and carries them to the organs which excrete them.

Carbon dioxide is brought to the **lungs** and is given off through the nose when we breathe out or exhale.

Some wastes from the blood are collected by the kidneys. Wastes from the **kidneys** go to the bladder as urine, which is excreted.

Sweat is given off by the **skin** through perspiration. This waste has salt and other waste dissolved in it.

The organs that are involved in excretion are the **liver, lungs**, **kidneys** and the **skin**.



ON YOUR OWN

1. How many forms of waste can be produced by the human body?

   _____

2. Name each form of waste that can be produced by the human body?

   _____

3. Name three examples of waste that is produced by the human body.

   _____

   _____

4. Which body waste comes through the pores of a human body?

   _____

5. Which body organ inside of the human body collects waste from the blood?

   _____

SUB-TOPIC: Organs of Excretion - The Excretory System

The Excretory System

The excretory system allows wastes to leave the body.

The excretory system helps to filter the blood of all waste material and from urine.

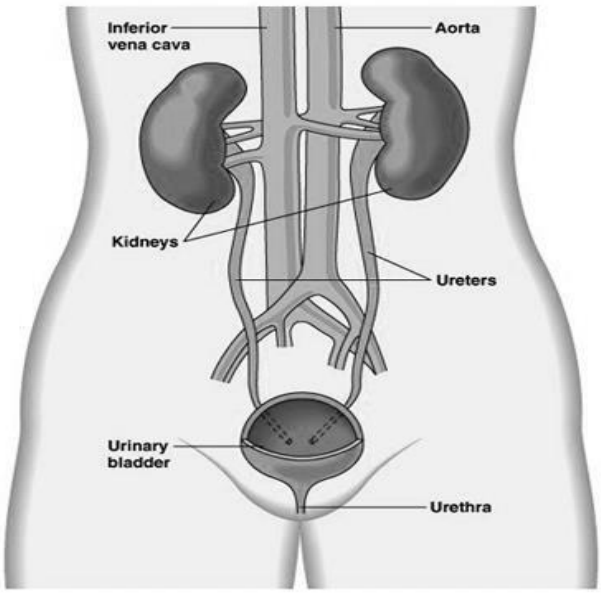
The organs or main parts in this system are:

- Kidneys
- Ureters
- Bladder
- Urethra

The main organ in this system in the excretory system is the **kidneys.**

How the Excretory System Works

- Blood containing waste products is carried by the arteries to the kidneys.
- The kidneys filter the waste products from the blood to form urine.
- These waste products are **salts** and **urea.**
- The urea and water come together to form urine.
- That urine is then taken through the ureter to the bladder.
- The bladder stores the urine.
- When the bladder is filled the urine is passed out of the body through the urethra.



ON YOUR OWN

1. Which is the main organ that helps the Excretory System to function?

   _____

2. State the function of the kidney in the Excretory System.

   _____

3. Which organ in the system stores urine before it is passed out of the body?

   _____

4. What name is given to the tubes that take urine to the bladder?

   _____

5. The tubes that take urine to the bladder is known as the _____ __.

SUB-TOPIC: Organs of Excretion - The Skin

The skin, the organ of touch is a continuous layer of tissue covering the entire body.

The skin has three functions:

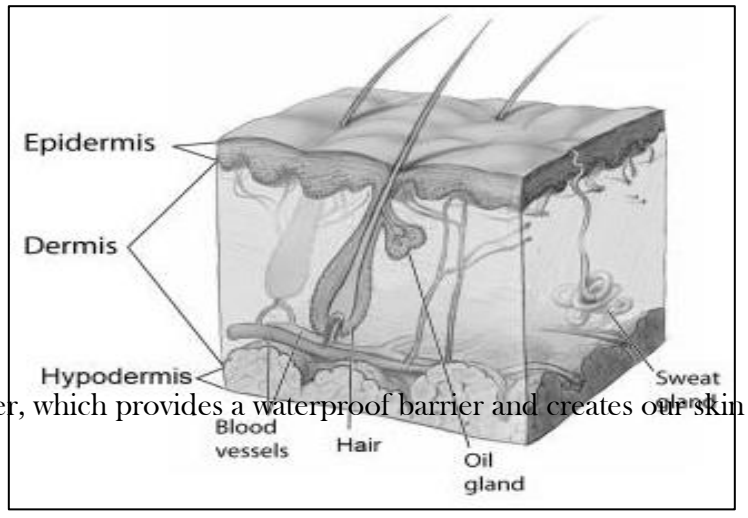
1. To protect the tissue underneath from:
   (A) Mechanical Injury
   (B) Ultra – violet rays from the sun
   (C) Bacterial Infection
2. It contains numerous sense organs which are sensitive to:
   (A) Hair Movement
   (B) Temperature i.e. hot or cold
   (C) Touch
   (D) Pain
   (E) Pressure
   (F) Awareness of the Environment
3. It regulates body temperature by getting rid of excess water through the pores.

NB

- The skin is a sense organ which helps us to feel.
- It is and organ of excretion.
- This is the largest organ of the body.
- The skin helps to keep our bodies at just the right temperature.
- It covers and protects everything inside the body.

The skin has three layers:

- Epidermis
- Dermis
- Hypodermis



The <u>epidermis</u> is the outermost layer, which provides a waterproof barrier and creates our skin tone.

The dermis is found beneath the epidermis and contains tough connective tissues, hair follicles and sweat glands.

The deeper tissue, the hypodermis, is made up fat and connective tissues.

ON YOUR OWN

1. What is one function of the skin?

   _____

2. Name the three layers of the skin.

   _____

3. Name two things found in the dermis.

   _____

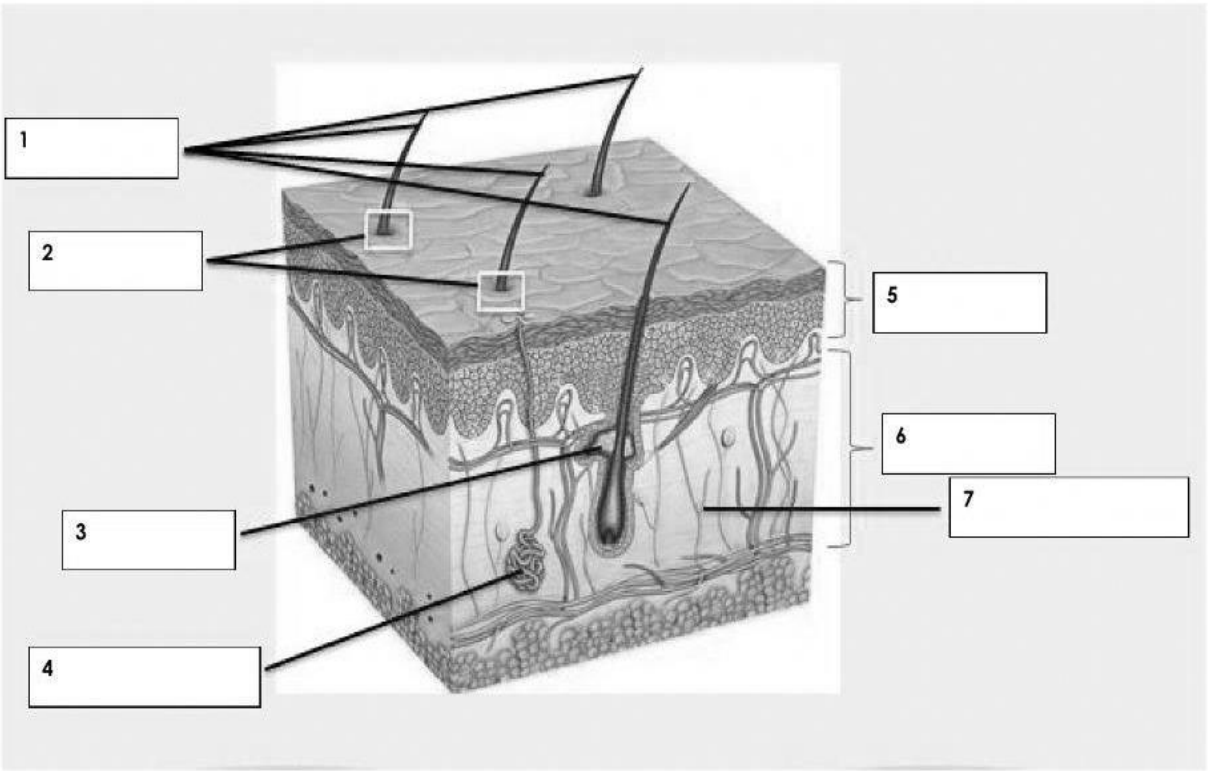
4. Look at your skin. Describe what you see.

   _____

   _____

5. Label the parts of the skin on the diagram using the names given below.

epidermis	fine hairs	sweat gland	nerve endings
dermis	pores	oil ducts	



SUB-TOPIC: The Respiratory System

The respiratory system helps us to breathe.

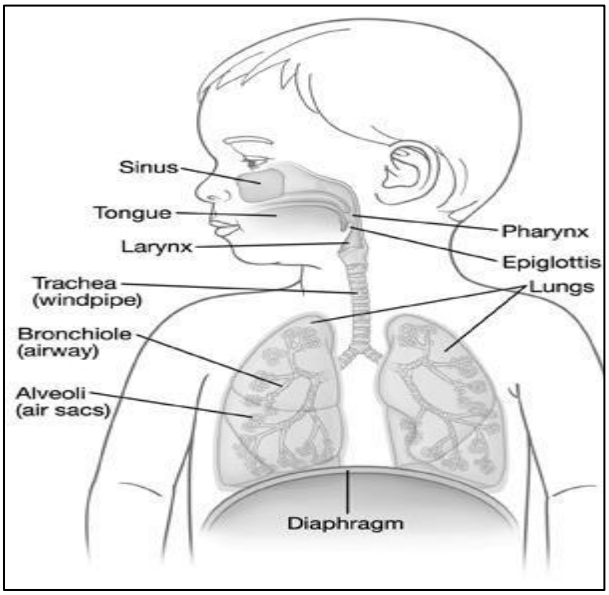
The Respiratory System has two important jobs. First, it supplies oxygen to the blood. This oxygen is carried to all cells of the body. In the cells the oxygen combines with nutrients to provide the energy the cells need to do their jobs. When oxygen combines with nutrients, the waste gas carbon dioxide is produced.

The second job of the respiratory system is to remove carbon dioxide from the blood and release it outside of the body.

Parts of the Respiratory System

The parts that help to make up the respiratory system are:

- Nose
- Mouth
- Throat (pharynx)
- Voice box (larynx)
- Windpipe or Trachea
- Airways (bronchi)
- Lungs.

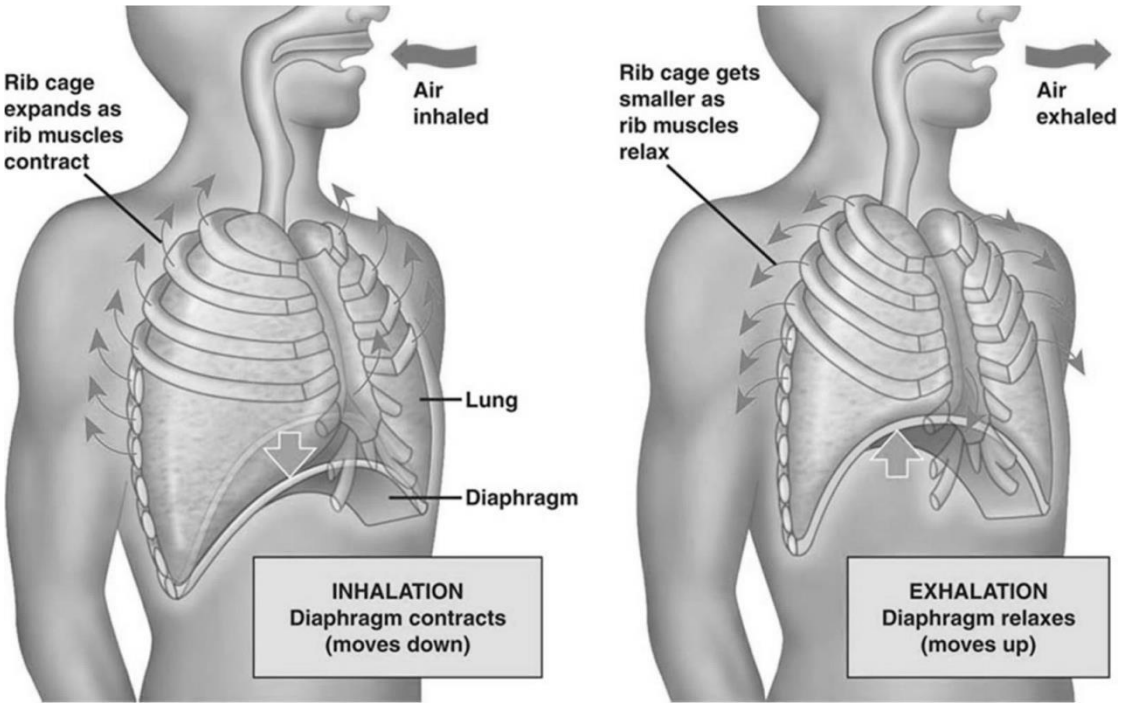


The main organ that is found in this system is the **lungs**.

How Breathing Works

- While breathing, the exchange of gases takes place.
- We breathe in oxygen and breathe out carbon dioxide.
- Carbon dioxide is the waste gas of the respiratory system.
- When we breathe in the ribcage moves up and out and the diaphragm moves down.
- When we breathe out the ribcage moves down and in and the diaphragm moves up.
- This breathing rate increases as we exercise.
- Because of this increase our muscles need extra oxygen and food.
- Muscles contract when we inhale but relax when we exhale.
- During the time of exercise, our lungs work faster to supply more oxygen.
- The body goes back to normal when we stop exercising.

- The process where carbon dioxide is exchanged for oxygen is known as <u>gaseous exchange</u>.



ON YOUR OWN

1) Unscramble the parts of the Respiratory System.

a) otlnirs _____

b) nyxrahp _____

c) alrxny _____

d) gunl _____

e) bohcsunr _____

f) aipgamrhd _____

g) rbhcio _____

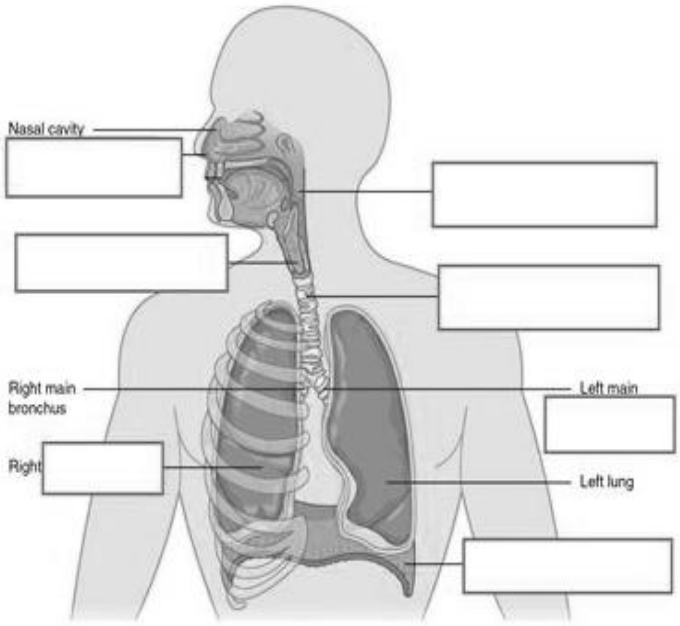
h) nocelihorb _____

i) aievoll _____

j) otuhm _____

k) rthceaa _____

2) Label the parts on this diagram of the Respiratory System.



TOPIC: Human Body

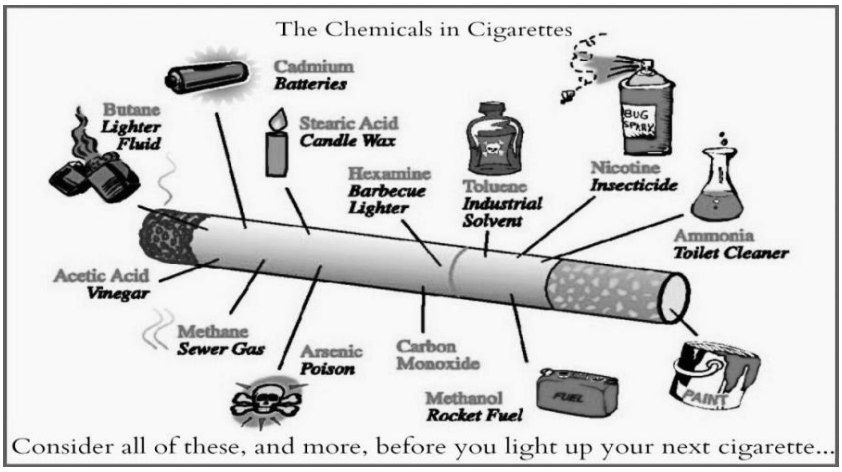
SUB-TOPIC: Effects of Smoking on the Respiratory System

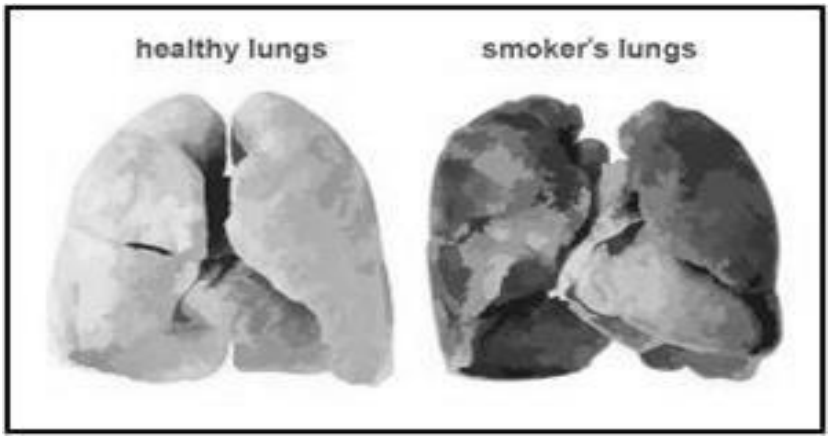
- Cigarette smoke produces nicotine, tar and carbon monoxide.
- Nicotine is a drug that causes addiction to cigarette smoking.
- Nicotine makes smoking habit-forming (addictive), raises heart rate and blood sugar.

  Effects of Nicotine

  - Increases heart beat rate.
  - Narrows blood vessel.
  - Raises blood pressure.
  - Interferes with digestion and decreases appetite.
  - Irritates nose, throat and lungs.

- Tobacco smoking is harmful to smokers and non-smokers.
- Tobacco smoking affects people with allergies and respiratory diseases.
- Tar sticks to the cells in the lungs, thus causing diseases such as, lung cancer, bronchitis and asthma.
- Smokers' cough and a shortage of oxygen also occur.
- Carbon monoxide is the same gas present in exhaust smoke.
- It is poisonous since it prevents the blood from carrying oxygen.
- This gas causes tiredness and breathlessness.
- When pregnant women smoke, the carbon monoxide content causes babies to born with low birth weight.





ON YOUR OWN

1. Name the substance that can be found in exhaust in vehicles which is dangerous for the lungs? _____
2. If Johnny decides to smoke very often, what is one of the possible outcomes that is likely to occur in his body?

   _____

3. What is name of one respiratory disease related to smoking?

   _____

TOPIC: Drugs

SUB-TOPIC: Harmful and Helpful Drugs

A drug is any substance other than food, which changes the way the body or mind operates.

Drugs can come in various forms such as tablets, liquids, ointments etc.

There are two kinds of drugs. They are:

- Legal or Helpful Drugs
- Illegal or Harmful Drugs

Legal or Helpful Drugs

- These are the drugs that can be used for helpful purposes.
- These drugs can be Prescriptive Dugs or Over the Counter (O.T.C) Drugs.
- Legal drugs can be harmful to the human body if misused.

Illegal of Harmful Drugs

- Illegal drugs are the drugs that are harmful and make the body operate in an abnormal way.
- Illegal drugs can cause the following effects:
  - Anxiety or Depression
  - Increased heart rate
  - Increased blood pressure
  - Heart Attacks

Examples of Drugs

Helpful/ Legal Drugs	Harmful/ Illegal Drugs
Panadol	Marijuana or Weed
Panadol Syrup	Cocaine
Aspirin	Crack
Tylenol	Heroin
Advil	Ecstasy
Excedrin	
Ointments	
Theraflu	



Harmful Drugs



Helpful Drugs

ON YOUR OWN

1. Define the term drugs

   _____

2. What are the two kinds of drugs?

   _____

3. Name two forms that drugs can take.

   _____

4. State one difference between a helpful and harmful drug.

   _____

5. Give two examples of harmful drugs.

   _____

SUB-TOPIC: Effects of Drugs

Effects of Drugs

We use drugs to treat diseases, promote healing and relieve pain. If the drugs are not used properly, some can cause severe health problems and even death.

Patent medicines, over the counter (OTC) and prescribed drugs or medicines usually have beneficial effects.

Drugs have expiry dates. It is important to read information on wrappers, labels and boxes.

Harmful or dangerous drugs alter the functions of the brain, are habit-forming (addictive), affect several bodily functions and social life.

Harmful or dangerous drugs include:

- Alcohol
- Nicotine from tobacco
- Caffeine from coffee and tea
- Marijuana which is also known as **ganga, "weed" or"joint"** and
- Cocaine which is also known as **coke, crack** or **"white lady".**

Drug	Description	Effect
Caffeine	It is found in coffee and coca cola soft drinks.	It makes you feel energetic but can alter sleep patterns and cause headaches.
Alcohol	It is found in wine and other alcoholic beverages.	Once used, the person becomes drunk and the brain cannot concentrate.
Nicotine	It is found in cigarettes that people smoke.	Smoking cigarettes damages the lungs and nicotine increases the heart rate.
Marijuana	Marijuana is smoked.	Marijuana makes you feel "high" and can cause panic attacks.

Cocaine	Cocaine is sniffed.	Cocaine makes you feel "high" and can cause hallucinations (sensations that appear to be real but are created by your mind. E.g. seeing stars)
Heroin	Heroin is injected into the body.	Heroin makes you feel "high" and can damage organs like the liver.

NOTE:

There are some drugs that are legal but can be harmful and can affect the body. These drugs are:

- Alcohol
- Tobacco (Cigarettes)

They can cause:

- Cancer
- Damage to the liver.
- Damage to the brain.
- Damage to the pancreas.
- Damage to the nerves.

ON YOUR OWN

1. List two effects of drugs.

   _____

   _____

2. Which is something that is important to do before taking any legal drug?

   _____

3. What does O.T.C represent?

   _____

4. What are prescriptive drugs?

   _____

5. Name two illegal drugs that can make you high.

   _____

TOPIC: Animal Kingdom

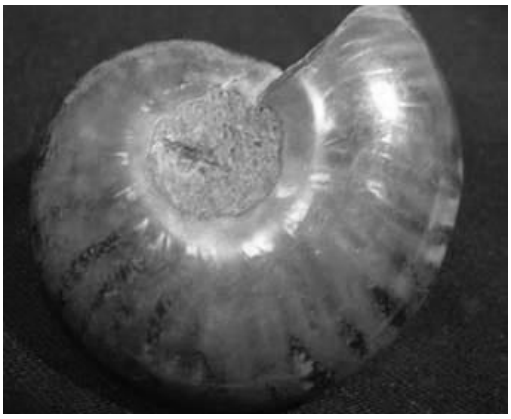
SUB-TOPIC: Invertebrates

Invertebrates are animals without backbones and internal skeleton. These invertebrates have external skeletons or exo-skeletons.

E.g. Marabunta, spider, honey bee, snail, cricket, wasps etc.



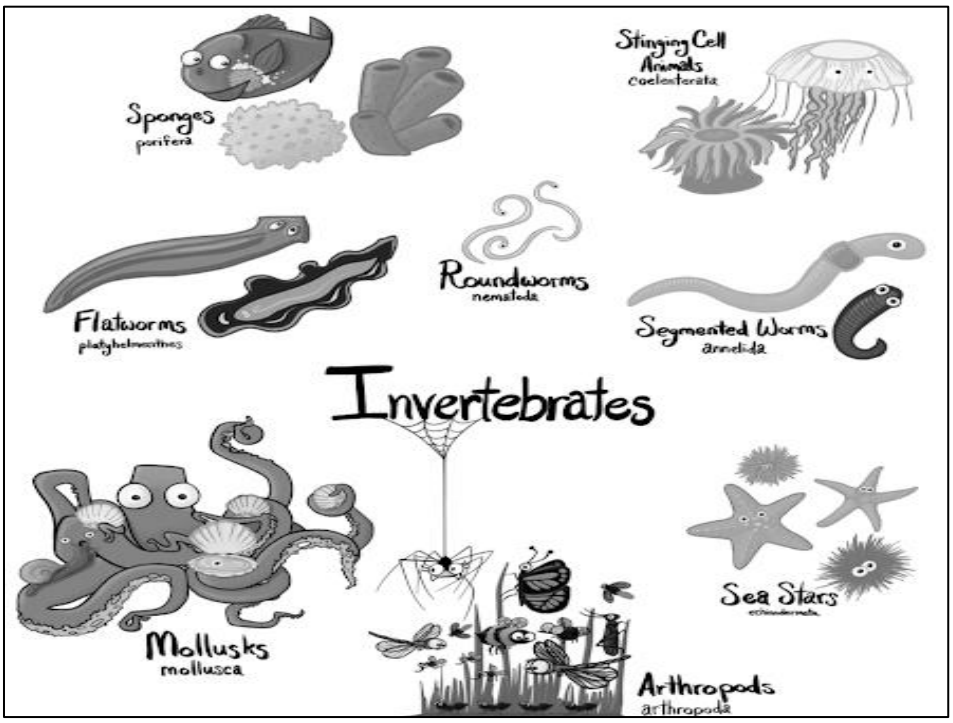






- Invertebrates are cold blooded and can be found everywhere.
- Invertebrates have various external features.
- Their body coverings vary from as soft as an earthworm to as hard as shells of crabs.
- Some invertebrates have no legs, others have six, eight or many more legs.
- Some have no wings and others have one or two pairs of wings.

- Invertebrates are grouped according to common structures.
- They are three main groups namely: **Molluscs**, **Worms** and **Arthropods**
- Arthropods are the largest group of Invertebrates.



ON YOUR OWN

1. Define the term invertebrate.

   _____

   _____

2. How does an invertebrate differ from a vertebrate?

   _____

3. How many main groups of invertebrates are there?

   _____

4. Which is the largest group of invertebrates?

   _____

5. What type of skeleton can be found on an invertebrate?

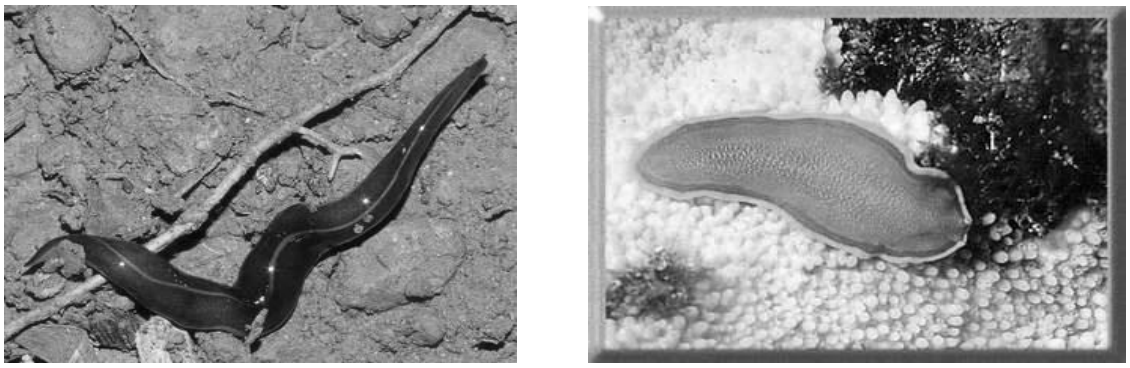
   _____

SUB-TOPIC: Invertebrates - Worms

- Worms are soft bodied invertebrates.
- Most worms have cylindrical shaped bodies.
- Worms have no wings or legs.
- Some worms live on land, few on water and others live in the bodies of animals.
- Worms have no eyes but can tell when it is near the surface because one of its ends is sensitive to bright light, which the worm avoids.
- Worms have no ears but perceive vibration from the soil.
- They are three (3) types of worms namely: **Flat Worms**, **Round Worms** and **Segmented Worms.**
- All worms breathe by diffusion of gases through their body wall.

(A)Flat Worms:

- Flat worms are the simplest worms
- Mostly parasites.
- Feed on other living things
- Examples are: fluke worm, tape worm, planarian worm and flat worms
- Tape worm and fluke worm are found in the bodies of other animals
- Planarian feeds on dead animals
- Tape worm is found in pigs
- Flat worms are known to have their habitat in fresh water environment.
- Flatworms are found under rocks or in the mud during the day.



Examples of Flat Worms

(B)Round Worms:

- Long and pointed at both ends.
- Bodies are tube like in appearances
- Hook worms and thread worms are round worms. They are parasites.
- Rounds worms harm other organisms in which they live or feed.



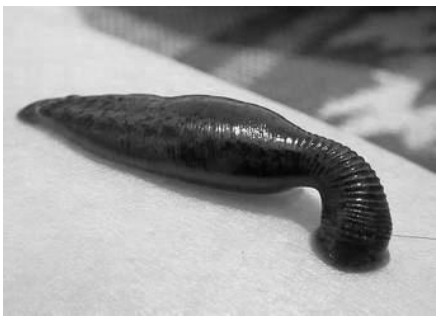
Round Worm



Hookworm

(C)Segmented Worms:

- Bodies divided into small parts or segments.
- Leeches ,Earthworm and Sandworms are segmented worms
- Leeches are found in damp places.
- Sandworms are found on the seashore.
- Earthworms are found in the garden and they help to enrich the soil.
- The body system of earthworms is more complex than that of other worms.
- Every earthworm has both male and female sex organs.
- Earthworms get air by breathing through their moist skin.





Leeches Earthworms



Sandworms

ON YOUR OWN

1. Why are worms classified as invertebrates?

   _____

2. The simplest worms are _____.
3. Flat worms breathe by _____.
4. Explain one importance of the earthworm to the soil.

   _____

   _____

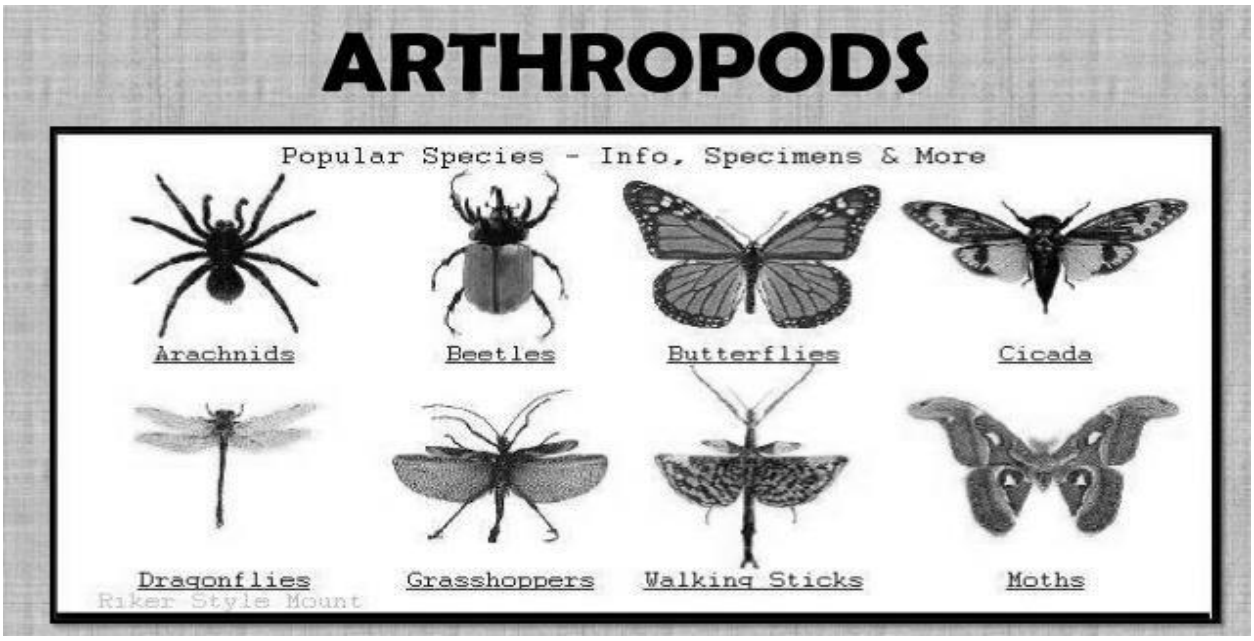
5. Where do tapeworms and fluke worms live?

   _____

   _____

The Arthropods

- Arthropods are invertebrates with external exo-skeletons.
- Have jointed legs and segmented bodies.
- Have hard covering outside their bodies.
- Have well developed sense organs e.g. compound eyes.
- Most Arthropods reproduce sexually.
- Arthropods are divided into four groups namely: **Insects**, **Arachnids**, **Crustaceans** and **Myriapods**.

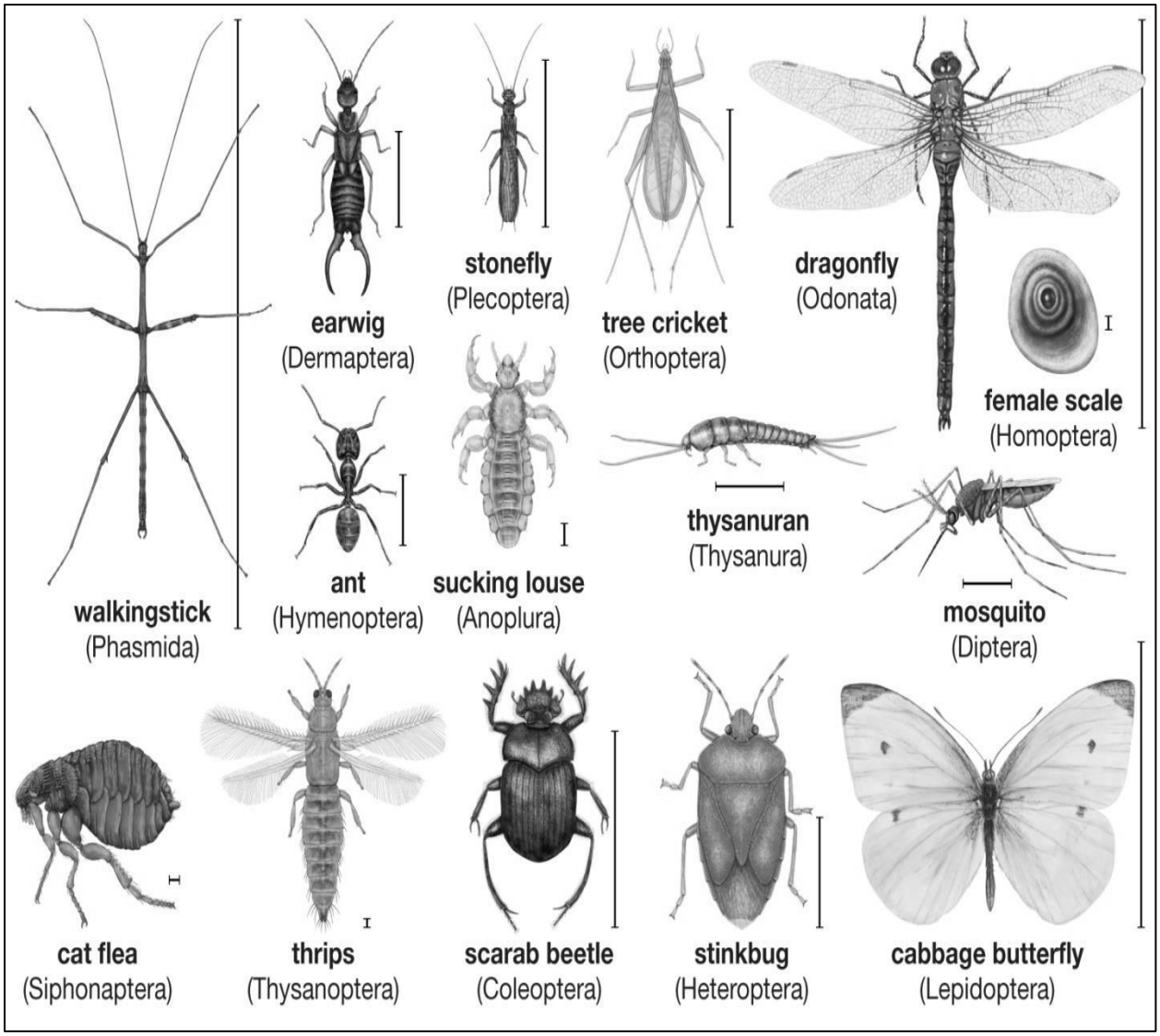


Insects

Insects are invertebrates. Instead of a spine or internal skeleton, an insect has an outer skin called an Exo-Skeleton. This forms a protective layer for the body. The body of an insect is divided into three distinct regions.

Insects :

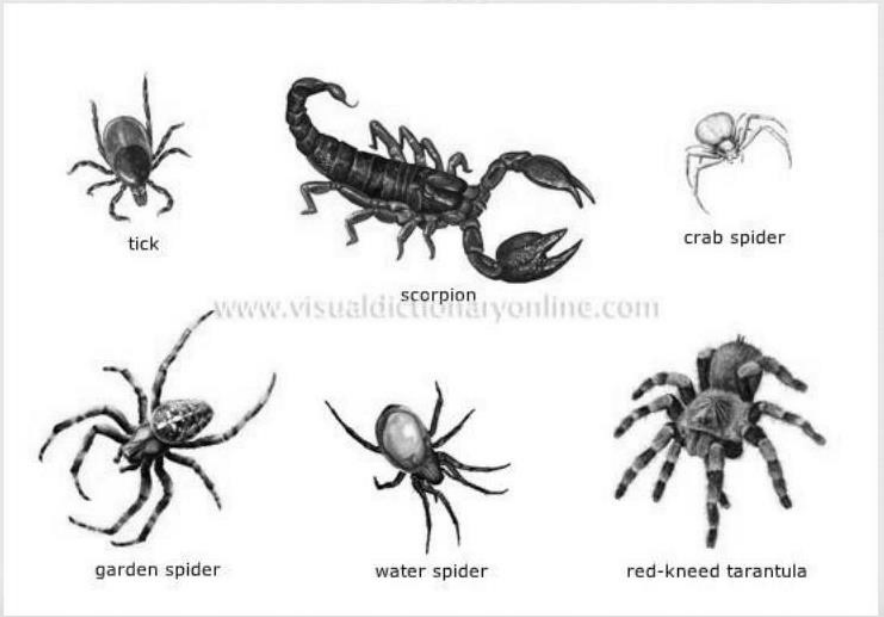
- Have six(6)legs.
- Only Arthropods capable of flying.
- Insects are the largest group of Arthropods.
- Insects have segmented bodies which includes the head, thorax and the abdomen
- They have a pair of antennae on their heads.
- They have two pair of wings.
- Some insects are wingless.
- Have an exoskeleton.
- Have 3 pairs or 6 jointed legs.
- Insects breathe by Tracheae.
- All insects grow from eggs.
- Go through various stages until they reach adulthood. This transformation is called **Metamorphosis**.
- Insects undergo either **Complete** or **Incomplete Metamorphosis**
- The head of an insect consists of Mouth parts, a pair of compound eyes and a pair of antenna.
- The Thorax consists of two pairs of wings and three pairs of legs.
- The abdomen consists of the sting.
- The tiny holes found on the insects bodies are called spiracles.



Pictures of Insects

Arachnids:

- Arachnids with four (4) pairs of walking legs.
- Have two body parts.
- Have exoskeleton.
- They are aggressive predators
- They are cold blooded.
- Have simple eyes
- Have spinnerets for web spinning
- Examples are spiders, scorpions, ticks and mites.



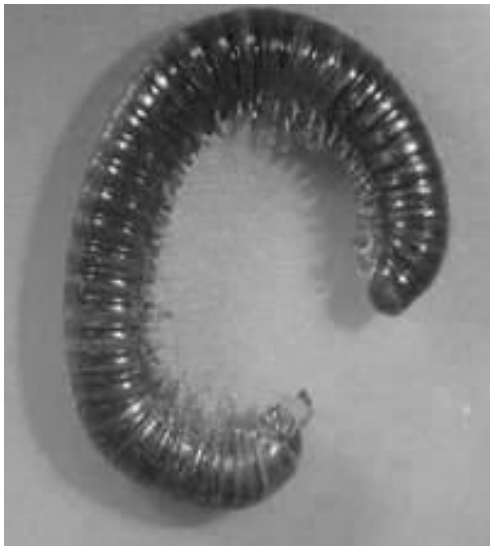
Pictures of Arachnids

Myriapods

- They are wormlike Arthropods.
- Have more than 10 pairs of legs.
- Live on land and burrow into the soil.
- Bodies divided into segments
- Examples of myriapods are millipedes and centipede.



Centipede

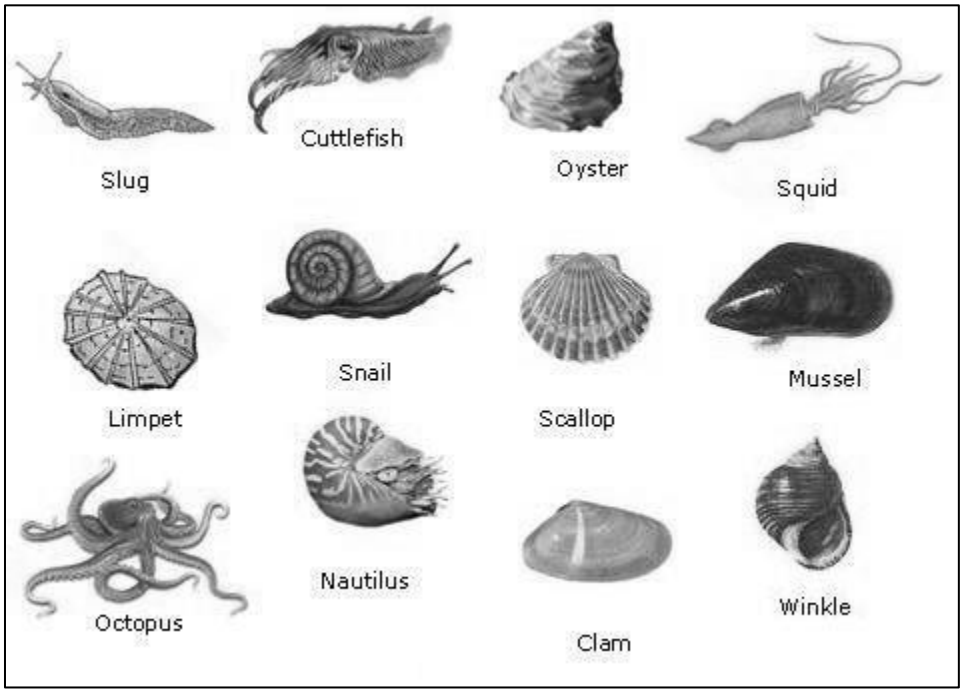


Millipede

Pictures of Myriapods

Molluscs:

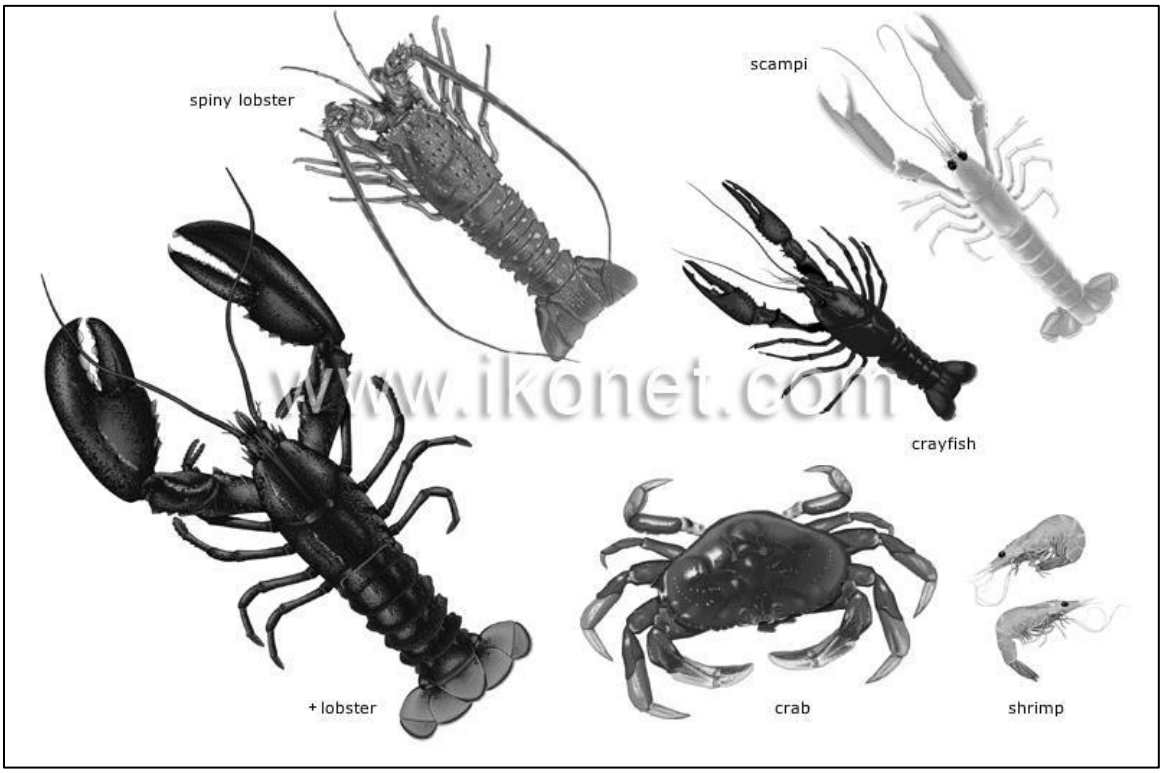
- Have smooth soft shiny bodies and usually have shell.
- Shells protect their bodies
- Snails, clams, oysters and mussels all have hard shells.
- Have muscular foot which they use to burrow in the sand or ocean floor.



Pictures of Molluscs

Crustaceans:

- Have 5 to 10 pairs of legs.
- Most crustaceans are marine animals (usually live in water)but some also live on land.
- Have 2 body parts
- Breathe by gills
- Have 2 pairs of antenna
- Examples are shrimp, lobster, prawns, crab, woodlice.



Pictures of Crustaceans

ON YOUR OWN

1. Which group of Arthropods is known as the Marine animal?

   _____

2. Insects go through various stages until it reaches adulthood. This is known as _____
3. Name two(2)invertebrates which are parasites

   _____

4. State two differences between insects and arachnids.

   _____

   _____

5. Identify:

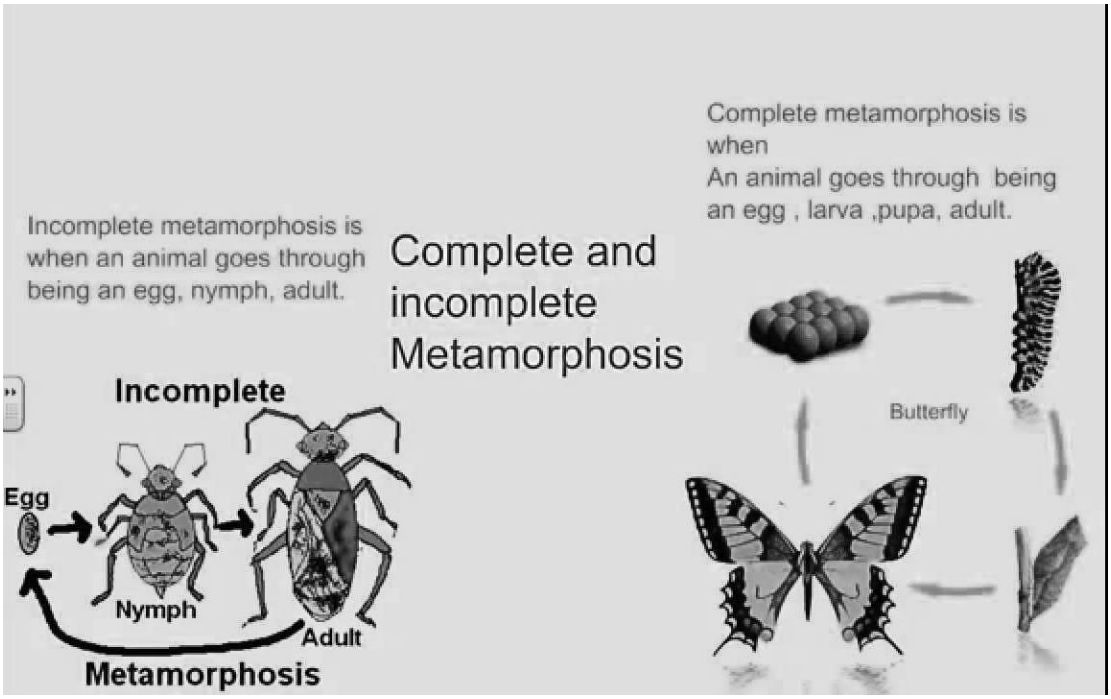
   (a) The largest group of invertebrates - _____

   (b) The largest group of Arthropods - _____

TOPIC: Animal Kingdom

SUB-TOPIC: Invertebrates – Metamorphosis

- Metamorphosis is the growth and development of an insect from an egg to an adult stage.
- Insects go through different stages of development.
- Some insects go through four(4) stages in their development while others go through three stages in their development.
- The housefly, butterfly and the mosquito undergo four stages in their development.
- These stages are egg, larva, pupa and imago (or adult)
- The cockroach, termites, dragon fly and the grasshopper undergo three stages these are the egg, nymph and the adult or imago.
- There are two types of metamorphosis. They are complete and incomplete metamorphosis.



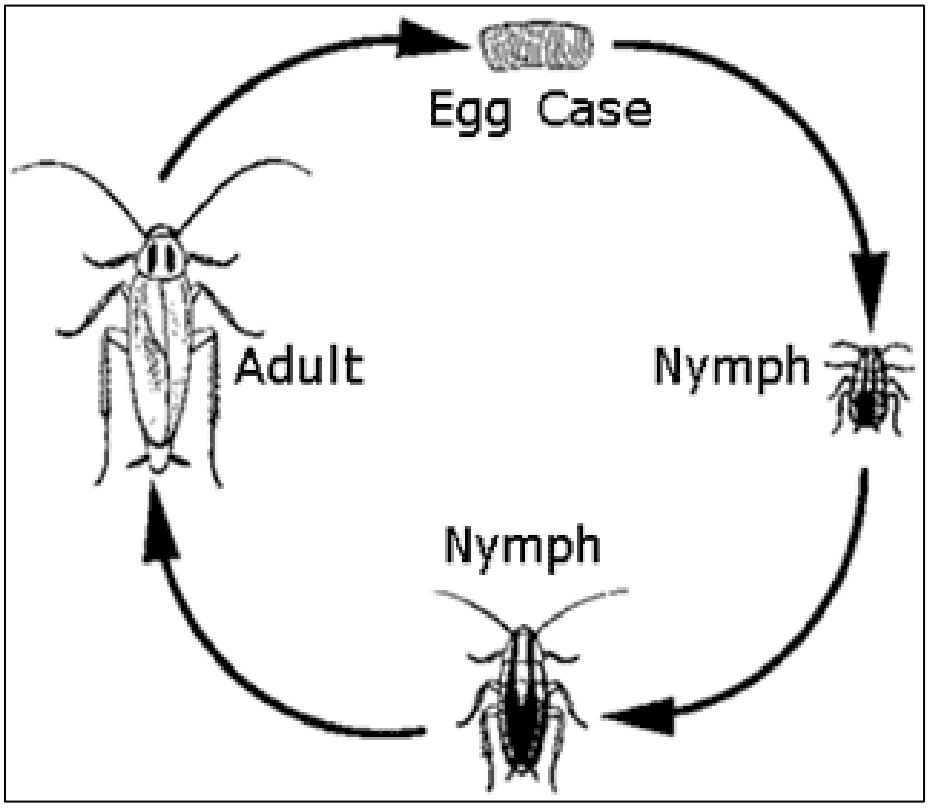
SUB-TOPIC: Invertebrates – Life Cycles of Insects

Incomplete Metamorphosis

Incomplete metamorphosis has three stages. These stages are the egg, nymph and imago (or adult). Some insects that undergo an incomplete metamorphosis are:

- cockroach
- grasshopper

Life cycle of a Cockroach



- The cockroach is an insect having two pairs of wings.
- It is an omnivorous animal since it eats anything.
- The cockroach depends upon its long antennae for feeling or smelling.
- The eggs are laid and kept by the female beneath the abdomen or are deposited in a dark corner.
- Each egg hatches into a nymph that resembles the adult. The nymph molts many times and gradually grows into an adult.

Egg:

- The cockroach life cycle starts with an egg.
- After mating the female creates an egg case with six to forty eggs.
- Females carry around an egg sack called an **ootheca**, safekeeping, depositing it in a secure location just before the eggs are ready to hatch.

Nymph:

- Newly hatched cockroach.
- Pale and soft and develops a hard exoskeleton shortly after hatching when it molts.
- A stage between molting is called an instar.
- The number of instars before a nymph reaches its adult phase varies by species.
- Some species develop into adults in several weeks, others do not mature until after several years of molting.

Adult:

- As long as a cockroach reaches maturity, it never molts again.
- Many species develops a pair of wings with their final molt.
- The presence of wings is the only identifiable difference between the nymph and the adults.
- The length of an adult cockroach life depends on its diet and environmental conditions.
- Under ideal conditions cockroaches may live for two years.

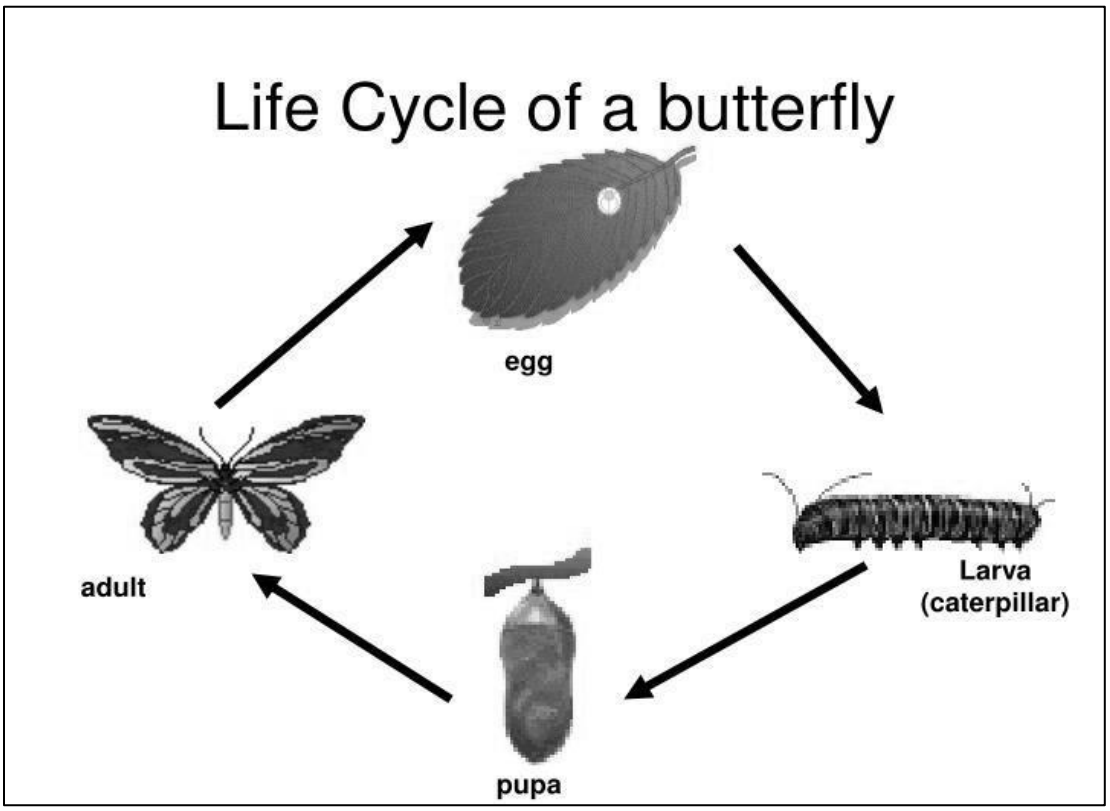
SUB-TOPIC: Invertebrates – Life Cycles of Insects

Complete Metamorphosis

Complete metamorphosis has four stages. These are egg, larva, pupa and adult.

Examples of insects that undergo a complete metamorphosis are houseflies, butterflies and mosquitoes.

Life cycle of a Butterfly



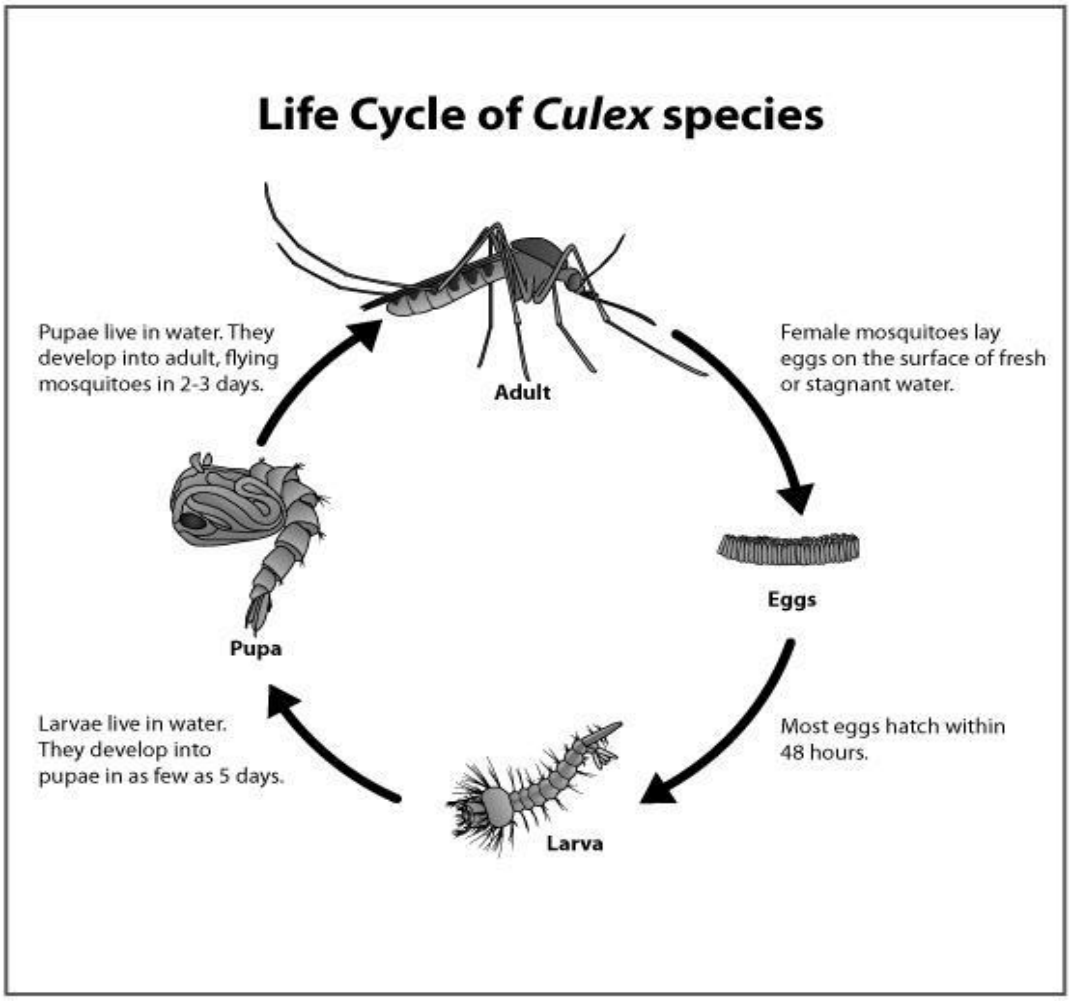
- Butterflies and Moths have a complete lifecycle. This means they are four separate stages each of which looks completely different and serves a different purpose in the life of the insects.

Egg Stage:

- The egg is a tiny, round oval or cylindrical object, usually with fine ribs and other microscopic structures.
- Females attach the egg to leaves, stems or other objects usually near the caterpillar food.

Larva Stage:

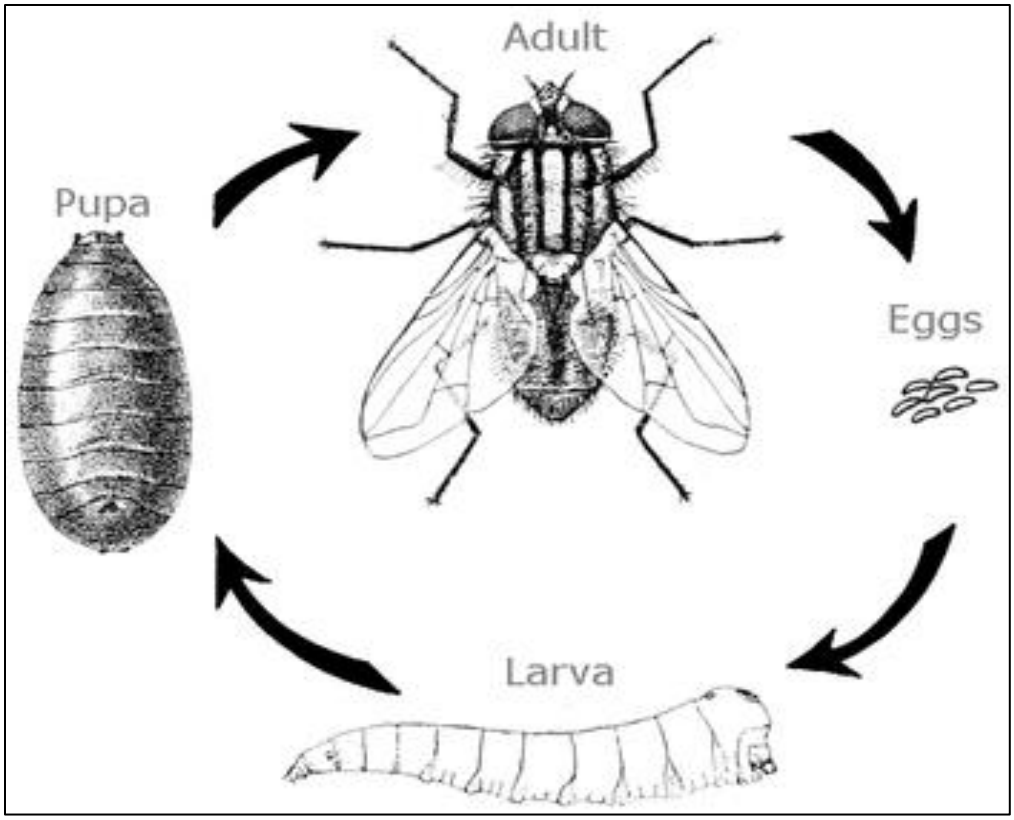
- The caterpillar (or larva) is the long, worm-like stage of the butterfly or moth.
- Often has interesting patterns of stripes or patches and have spine like hairs.



- Only the female mosquito sucks blood.

Life cycle of a Mosquito

- Mosquito eggs are laid in still water such as swamps, pools or water collected in old pots or tins.
- In these early stages the mosquito life cycle takes place in water.
- Between one to two days the larva escapes from the egg and enters the water.
- Within twelve days the larva becomes a pupa.
- After fourteen days the skin of the pupa splits and the mosquito climbs out.



Life cycle of a Housefly

- The body of the housefly is divided into head; thorax and abdomen.
- These are gray with black streaks and are covered with hair.
- Female housefly lays five to six sets of eggs of 100 to 150 eggs.
- Each egg is 1 mm long.
- The egg of a housefly takes about a day to hatch into a larva called a maggot.
- The maggot likes dampness but not light.
- After five days the maggot becomes a larva which is usually white in colour.
- It is during the course of this fifth to sixth day the larva becomes a pupa.
- Its colour changes to brown.
- The housefly emerges next.

ON YOUR OWN

1. Define the term Metamorphosis.

   _____

2. List 2 insects each which undergo Complete and Incomplete Metamorphosis.

   _____

3. The nymph stage is found in _____ Metamorphosis.
4. Another word that can be used in place of imago is _____
5. The second stage in the lifecycle of a butterfly is known as _____
6. Differentiate the between complete and incomplete metamorphosis.

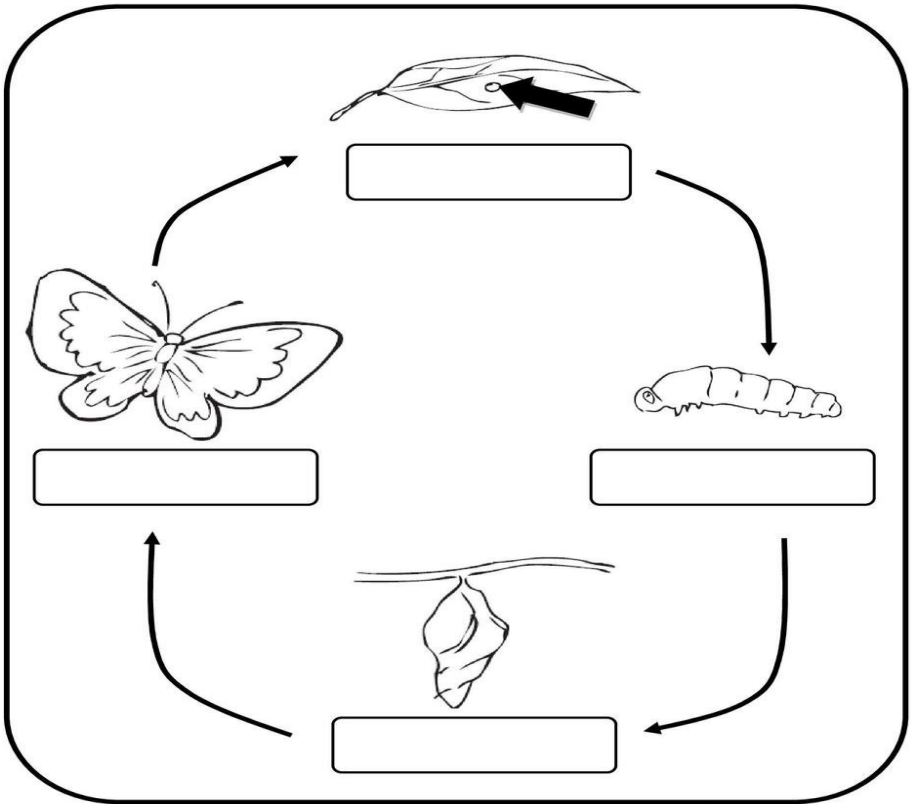
   _____

   _____

7. State one similarity of complete and incomplete metamorphosis.

   _____

8. Name the four stages in the life cycle of the butterfly.

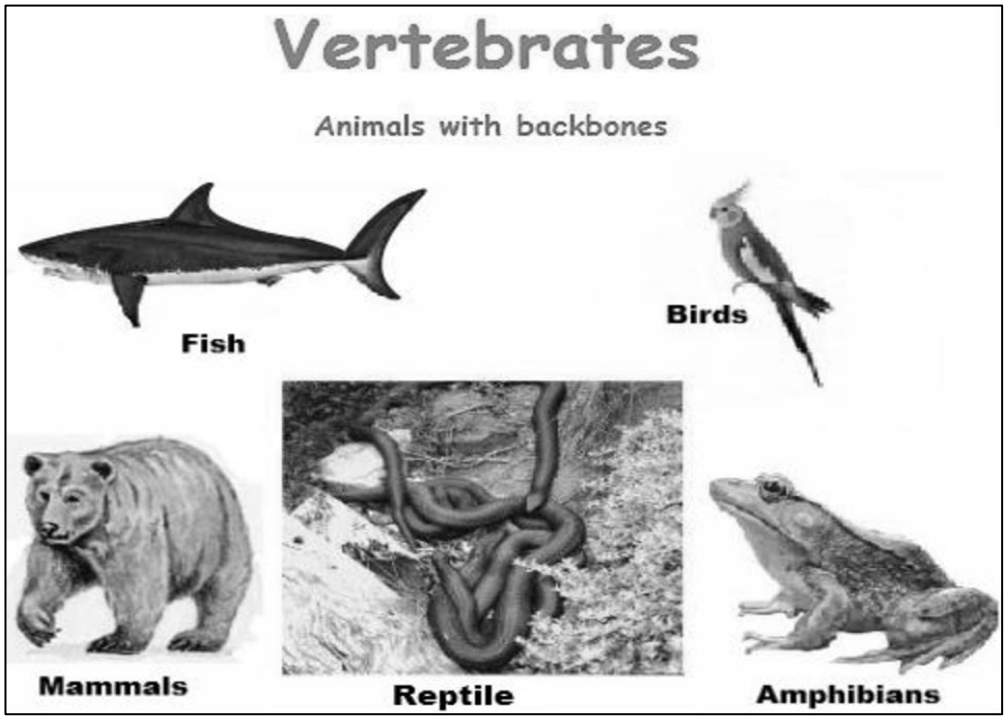


TOPIC: Animal Kingdom

SUB-TOPIC: Vertebrates

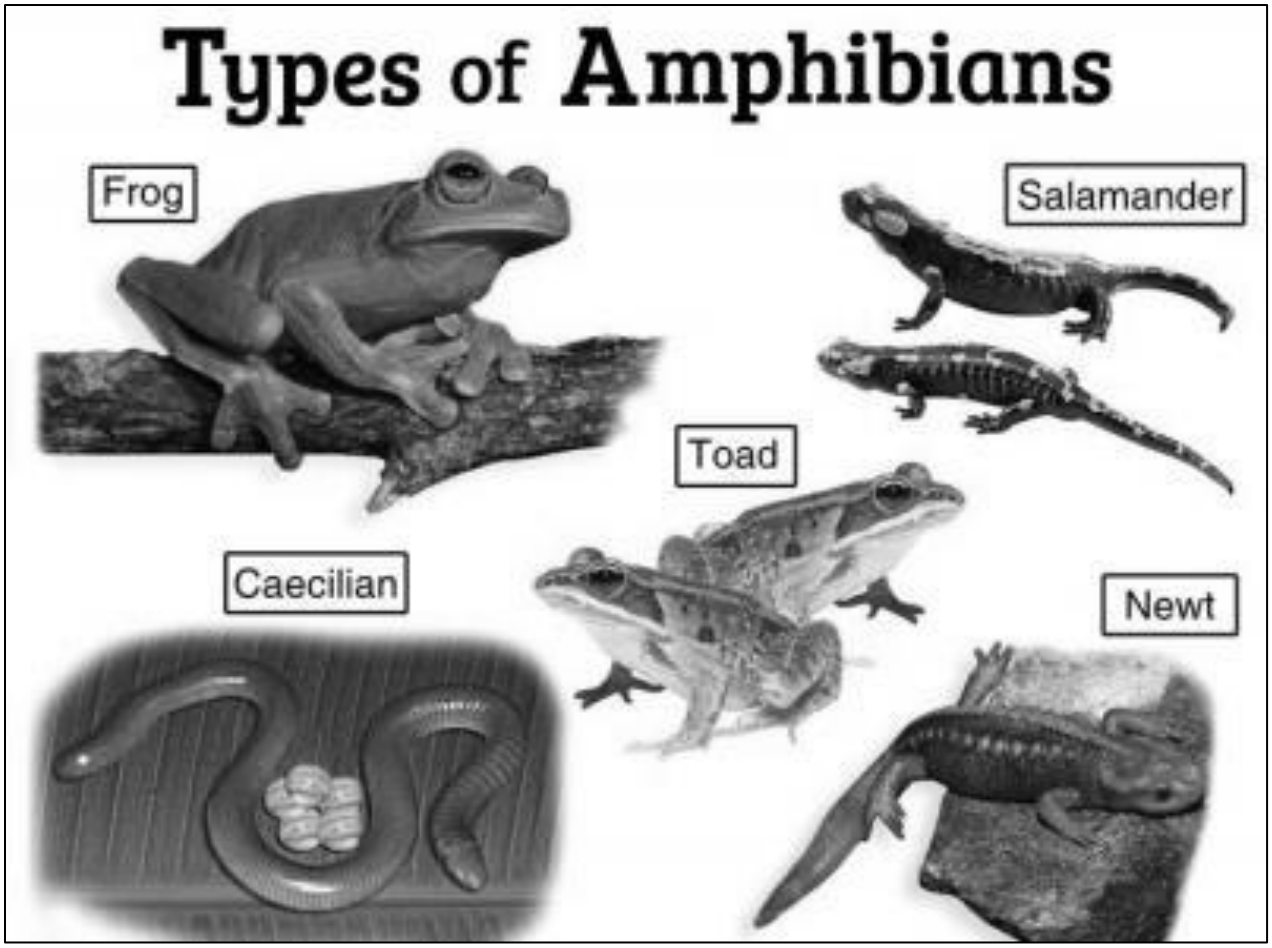
Vertebrates:

- Animals with backbones and internal skeleton called an endo-skeleton
- The endo-skeleton supports the body and gives the animal a definite shape.
- All invertebrates have a sense organs that helps them to hear, feel, taste, see and smell.
- Have a well-developed brain and heart.
- Vertebrates are divide into 5 groups are: **Mammals**, **Birds**, **Reptiles**, **Amphibians** and **Fishes**
- **Mammals** and **Birds** are **homo-iothermic** or warm blooded. This means that the bodies of mammals and birds are able to control their body temperature.
- **Reptiles**, **Amphibians** and the **Fishes** are **poikilothermic** or **cold blooded**. This means that their body temperature is controlled by their environment.

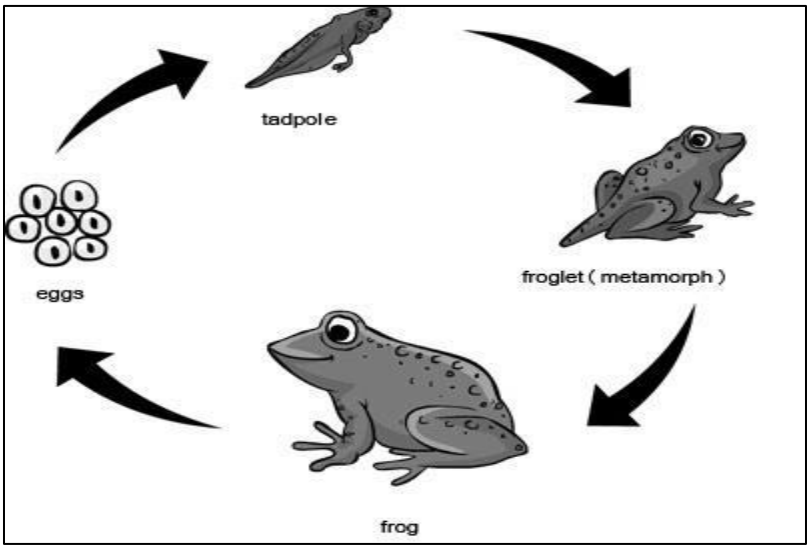


Amphibians:

- Large class of cold blooded vertebrates.
- The name means dual life because most amphibians spend the early part of their life in water and the later part on land.
- Live mostly in fresh waters and moist places.
- Few kinds of toads live in the deserts.
- Most have four limbs that they use for hopping, crawling and jumping.
- Can take oxygen and give out carbon-dioxide through their moist skin.
- While young they breathe by gills because they live in water and as adults they breathe by lungs because they generally live on land.
- Lay eggs in water. The eggs do not have shells
- They have a heart of three chambers
- Covered with thin and moist skin.
- Examples of Amphibians are frog, toad, crapaud and salamander


Types of Amphibians
Frog
Salamander
Toad
Caecilian
Newt

Life Cycle of a Frog



- A female frog lays hundreds of eggs after which the male fertilizes them.
- Some of these eggs get destroyed on exposure to wind and rainfall.
- Therefore out of hundreds of eggs only a few get fertilized
- A layer of jelly holds the eggs together and provides protection for the eggs.
- This whole mass of fertilized eggs in the jelly is called a **spawn**.

After a few days:

- Tadpole hatches out of the egg.
- It feeds on the yolk of the eggs from which it hatches.
- External gills appear.
- Tail elongates
- Fins develops

After a few weeks:

- External gills disappear.
- Tadpole develops hind limbs.
- Tadpole develops into a froglet.
- Develops forelimbs
- Develops lungs for breathing.

Final Stage:

- Tail becomes smaller and finally disappears.
- Frog enters adult stage
- Frogs have long sticky tongue for catching prey.
- Frogs have webbed feet for swimming.
- Frogs camouflage to keep them hidden from predator and prey.

ON YOUR OWN

1. Why are Amphibians classified as invertebrates?

   _____

2. Some amphibians may use camouflage to _____.
3. Explain what the sticky tongue in the frogs helps them to do.

   _____

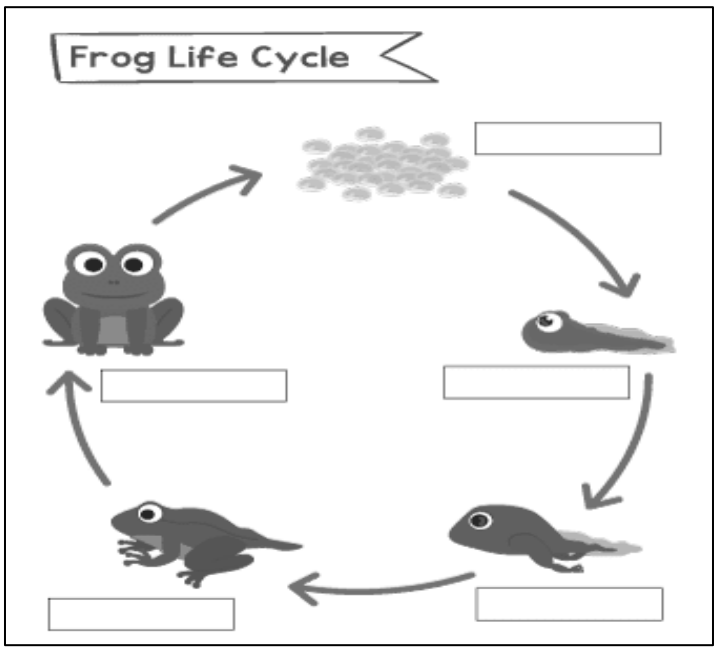
   _____

4. Distinguish between the terms homo-iothermic and poikilothermic.

   _____

   _____

5. Complete the diagram below.



TOPIC: Plant Kingdom

SUB-TOPIC: Function of Leaves - Photosynthesis

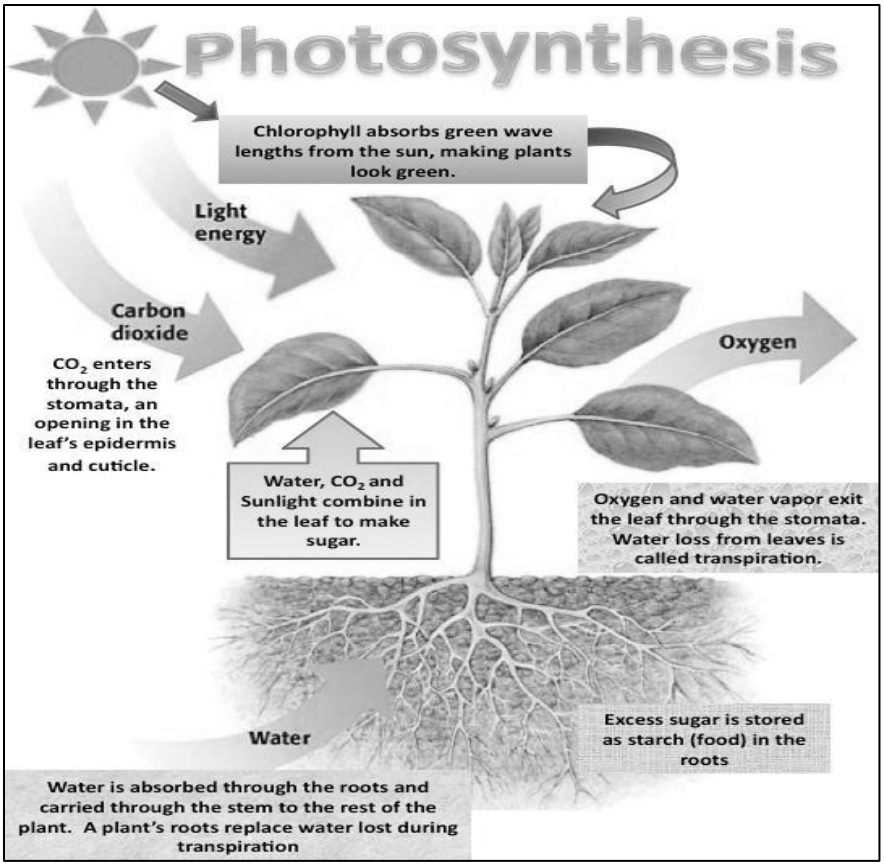
The leaves of the plant perform many important functions.

- Every leaf works to produce food for the plant by means of a chemical process called Photosynthesis. Without the food produced by photosynthesis in the leaves, plants could not grow.
- All life depends on plants because they are the only living things that can make their own food.
- Photosynthesis is carried out by tiny cells in the leaf.
- There are three essential factors that a leaf needs to carry out this very important function.
  (1) **Water** – water, which the plants get from the ground is absorbed by the roots and transported to the leaves via the stem.
  (2) **Air** – Air enters the leaf through the holes or pores called stomata. The stomata is located on the underside of the leaf.
  (3) **Light** – Light is the third factor and comes from the sun. Because sunlight is absolutely necessary for photosynthesis, the leaf does its work during the day time.
  Chlorophyll is a special ingredient which the plant uses. This ingredient is the pigment which makes the plants green.

The Process of Photosynthesis

As sunlight enters the leaf:

- The energy of the sun splits the water provided by the roots, into the two gases of which it is made – hydrogen and oxygen.
- The oxygen is released through the stomata into the air, where it is available to be breathed by the people and animals.
- The hydrogen is combined with carbon dioxide, taken from the air to form a type of sugar known as glucose. Glucose is the food that plants need to live. The glucose is transported for storage in other parts of the plant.



ON YOUR OWN

1. Define the term photosynthesis.

   _____

   _____

2. Name the three essential factors that a leaf needs in order to carry out the function of photosynthesis.

   _____

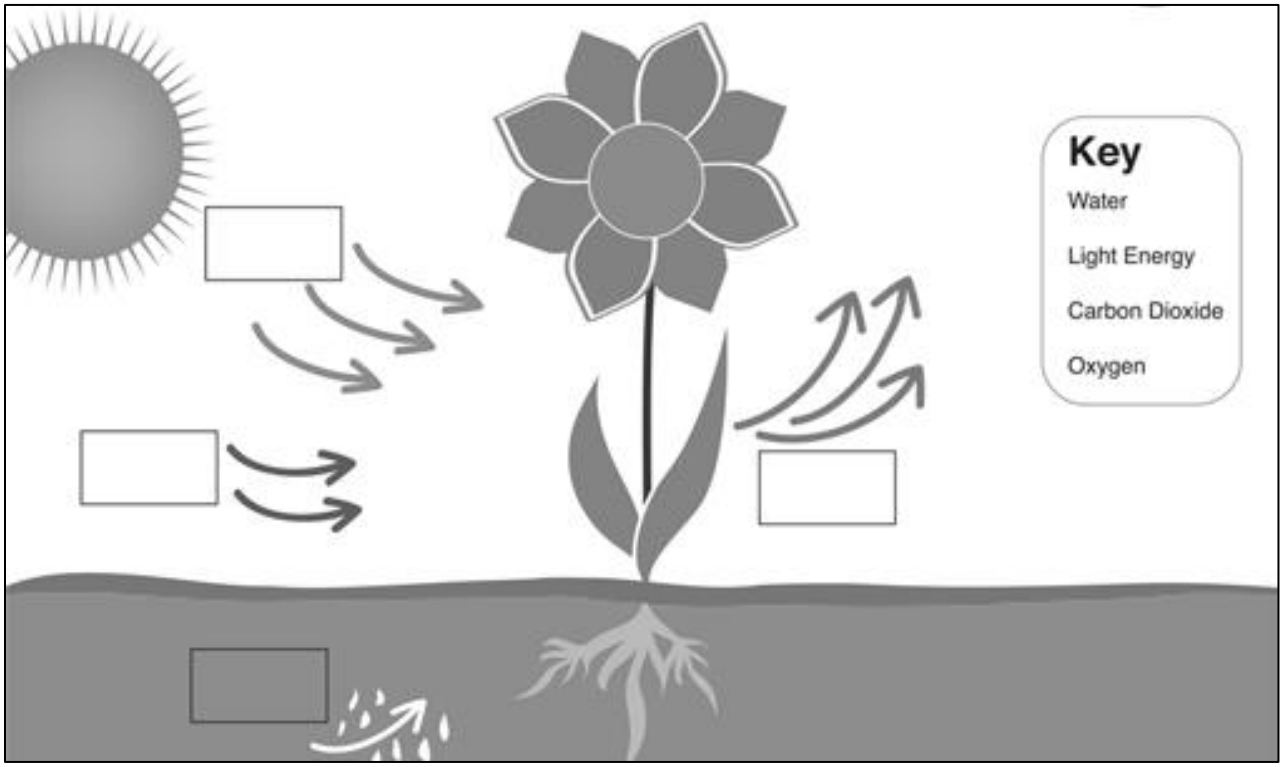
   _____

   _____

3. Where does the leaf get its light that is needed for the process of photosynthesis?

   _____

4. Label each component by using the key on the right.



TOPIC: Plant Kingdom

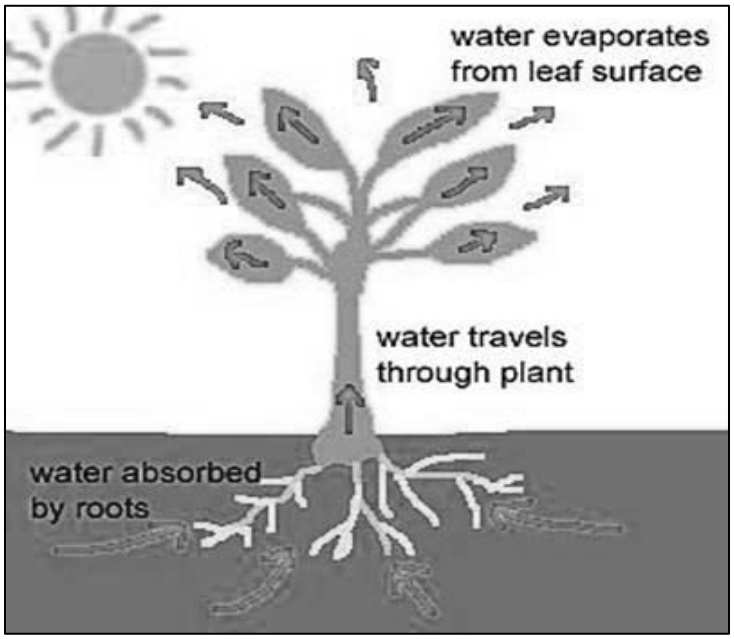
SUB-TOPIC: Function of Leaves – Transpiration

The roots of the plants are continually taking up water from the soil because the plants need dissolved mineral salts it contains to make food. This means that the plants would normally have excess water that must be given off.

Another function of leaves is to give off excess water through the process called Transpiration.

- Transpiration is the loss of water of vapour from the leaves or stems of plants.
- Transpiration causes most of the water which enters the plant to be lost as water vapour through its leaves.
- The water vapor passes out through the stomata of the leaves.
- The size of the stomata is regulated by special cells called **guard cells.**
- Several factors affect the rate of transpiration. Some of these are:
    - The humidity of the air
    - The temperature
    - The intensity of the sunlight
    - The wind speed
    - The amount of carbon dioxide in the air
    - The amount of soil available

The Transpiration Process



ON YOUR OWN

1. What is transpiration?

   _____

2. Which part of the plant does transpiration occur?

   _____

3. What are two factors that can affect transpiration from occurring?

   _____

   _____

4. Which part of the leaf allows the water vapour to pass out?

   _____

TOPIC: Plant Kingdom

SUB-TOPIC: Seeds – Parts of a Seed

A seed is formed within the ovary of a flower and contains a tiny embryo which is capable of growing into a mature plant.

Characteristics of a Seed

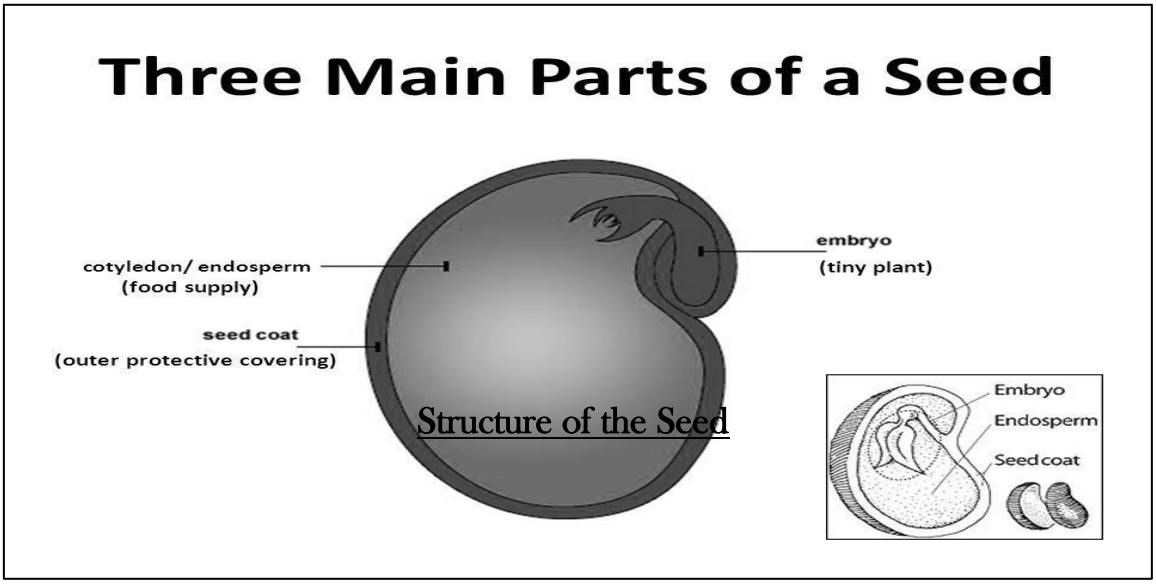
- Seeds come in different shapes and sizes.
- They vary in colour.
- Some seeds are hard and some are soft but they all have the same parts.

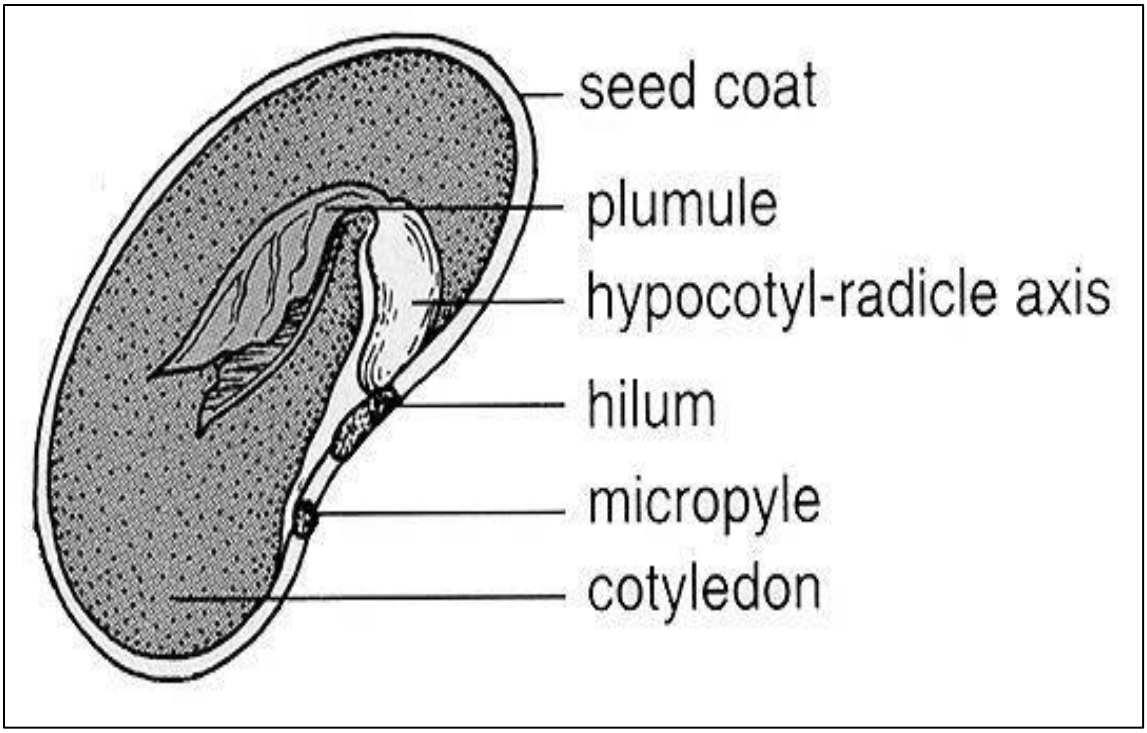
Each Seed has three main parts:

(A) The Embryo (new plant) which is made up of the plumule and the radicle.

(B) An endosperm, from which the cotyledons absorb stored food.

(C) The seed coast, a tough outer covering of the seed.





- **The Testa or Seed Coat**

The seed coat or testa is the outer layer of the seed which and it serves to protect it from diseases and insects.

The seed coat will also swell for the germination process.

- **The Micropyle**

This is a tiny opening through which the water is absorbed to help release the embryo.

- **The Hilum**

This is a scar and it attaches the seed to the pod.

- **The Embryo**

The Embryo is made up of three parts: The cotyledons or seed leaves, the plumule and the radicle or hypocotyl.

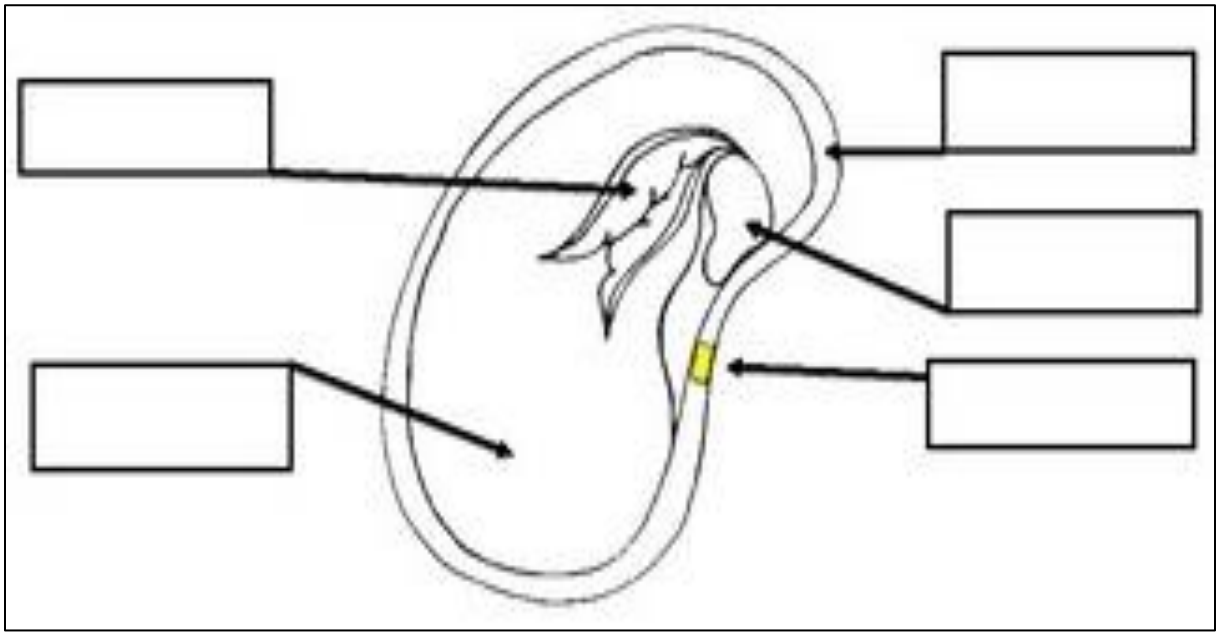
- **The Cotyledons -** The Cotyledons supply the seedling with food until it can carry out the process of photosynthesis.
- **Plumule -** The plumule is a tiny shoot which will become the stem and the leaves.
- **Radicle -** The radicle is a small root which will become the root system and one or two cotyledons.

Plants whose seeds have only one cotyledon are called monocotyledons.

Plants whose seeds have two cotyledons are called dicotyledons.

ON YOUR OWN

1. Label each part of the seed correctly.



TOPIC: Plant Kingdom

SUB-TOPIC: Seeds – Germination

Germination is the process whereby a seed develops into a young plant.

Seeds require three main conditions for germination to occur. These conditions are:

1. An adequate amount of moisture.
2. An adequate supply of air/oxygen.
3. A favourable temperature.

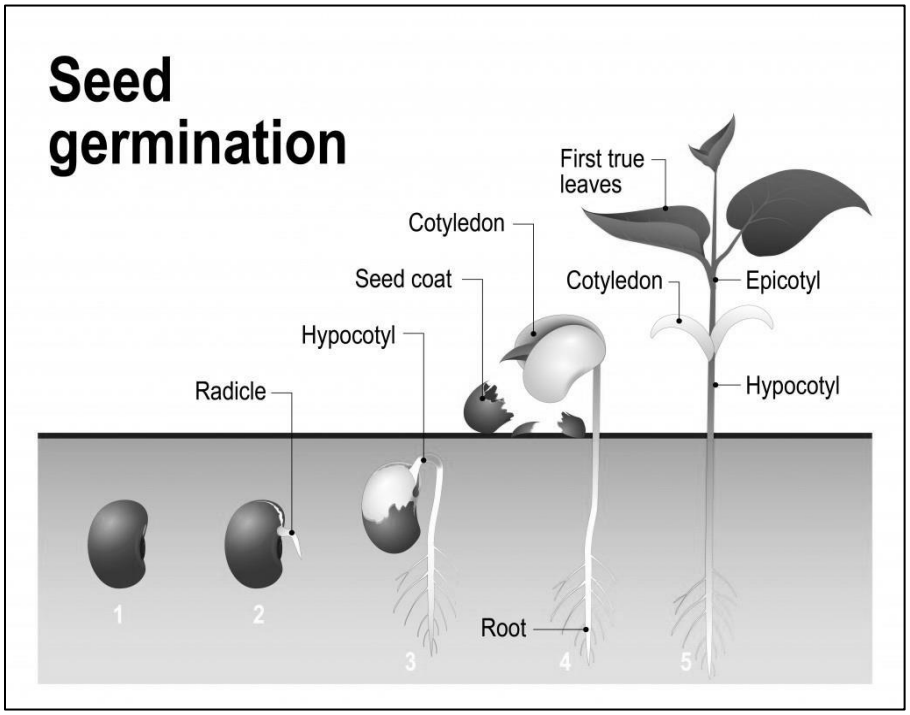
Unless these conditions are present to begin the germination process, the seed remains dormant and inactive.

The Germination Process occurs in stages.

(A) The seed swells by soaking up or absorbing water through the tiny hole in the seed called the Micropyle. The water activates certain enzymes which break down stored food.

(B) The tiny radicle or young root begins to push its way through the softened seed coat and into the ground. The root grows downwards so that they can provide adequate water and nutrients for the shoot after it breaks through the soil surface.

(C) The tiny shoot or plumule emerges above the surface of the ground and develops leaves. Photosynthesis, the food making process of the plant begins to take place.



The main function of the cotyledons is to provide food for the plant until its roots and leaves have developed sufficiently to begin absorbing water, minerals and food.

When the plant has used up all food provided by the cotyledons, these structures shrivel and die. The plant is now a seedling and germination has ended.

Types of Germination

There are two types of germination.

They are:

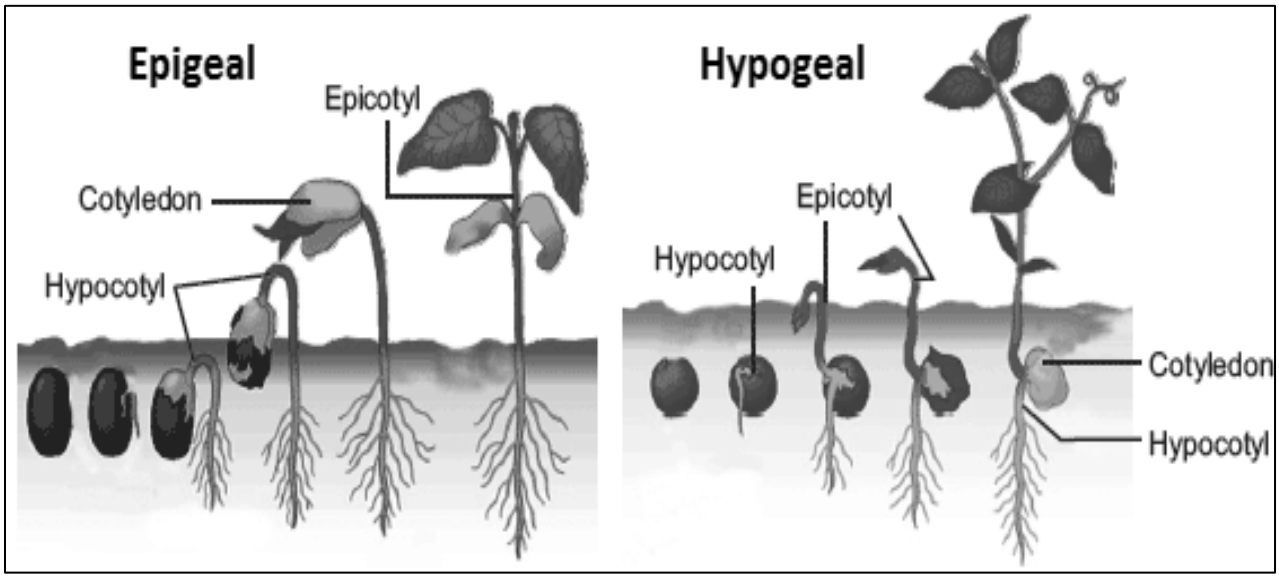
- Epigeal Germination
- Hypogeal Germination

Epigeal Germination

Epigeal germination is when the cotyledons appear above the soil. Examples include bora and tamarind.

Hypogeal Germination

Hypogeal germination is when the cotyledons remain below the soil. Examples are the corn, coconut, awara, mango and genip.



ON YOUR OWN

1. Define the term germination.

   _____

2. List two conditions necessary for germination to occur.

   _____

3. The two types of germination are _____ and

   _____.

4. In _____ germination, the cotyledons remain below the soil.

5. If the conditions of germination is not met, what is likely to happen to the seed?

   _____

   _____

TOPIC: Plant Kingdom

SUB-TOPIC: Monocotyledonous and Dicotyledonous Plants

Features of Monocotyledonous Plants

Flowering plants are divided into monocotyledons and dicotyledons.

These two groups differ in many ways, such as:

- Cotyledons
- Roots
- Leaves
- Flowers

Monocotyledonous Plants have:

- Seeds with one cotyledon.
- Fibrous roots which have no main roots and do not grow deep.
- Leaves with parallel veins.
- Flowers with petals arranged in multiples of three.

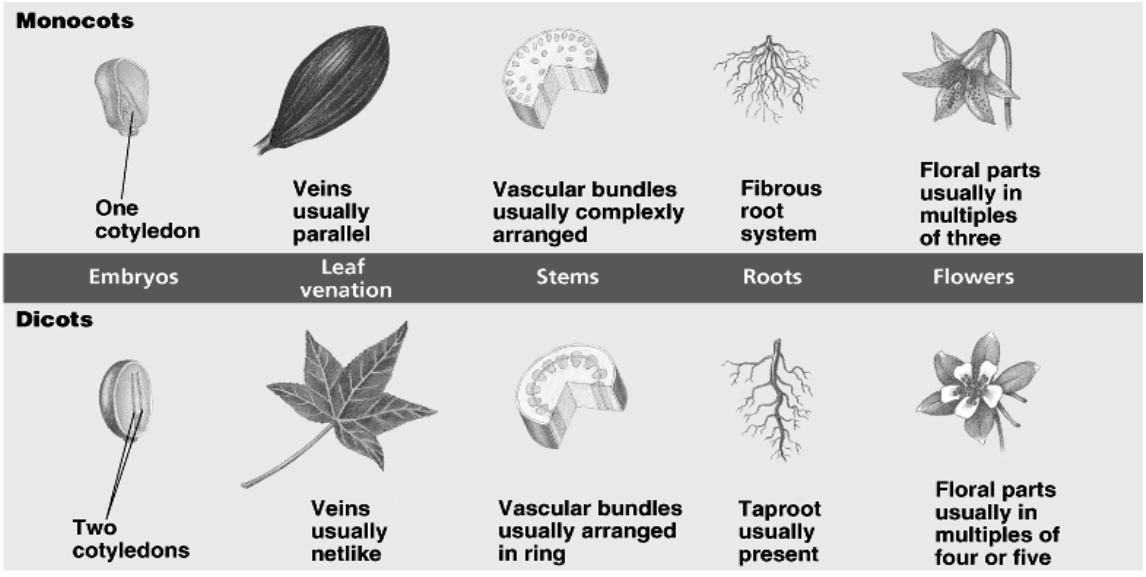
Examples of plants with seeds that are monocotyledonous are corn, banana, orchid, palm, pineapple, sugarcane rice, bamboo and other flowering plants in the grass family.

Features of Dicotyledonous Plants

Dicotyledonous Plants have:

- Seeds with two cotyledons.
- Tap roots which have main roots and grow deep.
- Leaves with net veins.
- Flowers with petals arranged in multiples of fours and fives.

Examples of plants with seeds that are dicotyledonous are cherry, pepper, buttercup, rose, marigold, grape, carrots, guava, apple, pepper, peas and beans.



ON YOUR OWN

1. How many cotyledons does a monocotyledonous plant have?

   _____

2. State two ways in which the two cotyledons differ.

   _____

   _____

3. Name one example of the following.

   (i) Monocotyledonous plant _____

   (ii) Dicotyledonous plant _____

4. State the type of leaf that can be found on a

   (i) Monocotyledonous plant _____

   (ii) Dicotyledonous plant _____

5. State the amount of flower petals that can be found on a

   (iii) Monocotyledonous plant _____

   (iv) Dicotyledonous plant _____

6. Tap root is to _____ plants as fibrous root is to

   _____ plants.

TOPIC: Plant Kingdom

SUB-TOPIC: Monocotyledonous and Dicotyledonous Plants

Tap Roots and Fibrous Roots

Roots

Roots are the organs of the Root System. There are two basic root systems.

(a) The Tap Root System

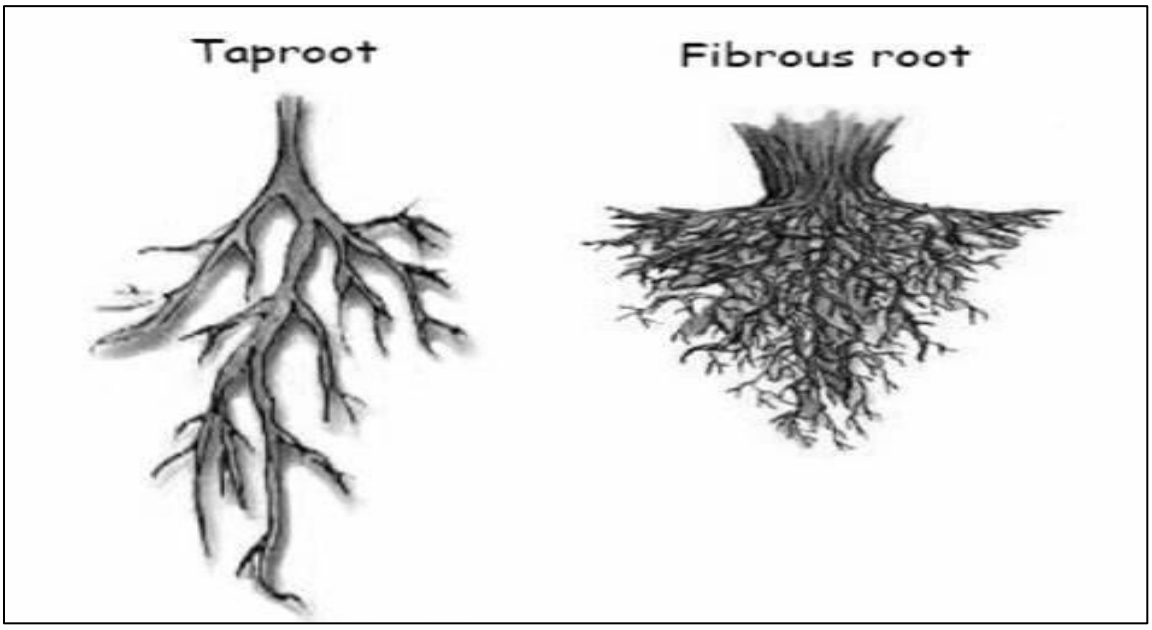
(b) The Fibrous Root System

(A) The Tap Root System

The tap root system is where the primary root or main root grows down and remains larger than the secondary or lateral roots which branch out from it. Dicotyledonous plants have tap roots.

(B) The Fibrous Root System

The fibrous root system is where the primary root remains small and many slender secondary rootlets grow from it in all directions. The roots resemble a stringy mass of fibres. All monocotyledonous have fibrous roots.



Uses of Roots

- Roots anchor the plant firmly in the soil.
- Roots absorb water and minerals from the soil.
- Some roots store food.
- Some roots help in the prevention of soil erosion.

ON YOUR OWN

1. Two functions of the root of the plant are:

   (i) _____

   (ii) _____

2. Draw each of the following.

(A) Tap Root (B) Fibrous Root

