

FORM 2 SCIENCE 2022

STRANDS	SUB-STRANDS
8.0: SCIENCE SKILLS	<ul style="list-style-type: none">▪ Laboratory Safety/ Equipment▪ Science Skills
8.1: LIVING WORLD	<ul style="list-style-type: none">▪ Cell▪ Disease▪ Micro- organisms▪ Plant in Tonga▪ Animal in Tonga▪ Respiratory System▪ Digestive System
8.2: PHYSICAL WORLD	<ul style="list-style-type: none">▪ Energy▪ Force
8.3: MATERIAL WORLD	<ul style="list-style-type: none">▪ Mass▪ Volume▪ Density▪ Physical and Chemical change
8.4: PLANET EARTH AND BEYOND	<ul style="list-style-type: none">▪ Moon▪ Tide▪ Stars▪ Soil

UNIT 8.1: LIVING WORLD

Major Learning outcome for UNIT 8.1:

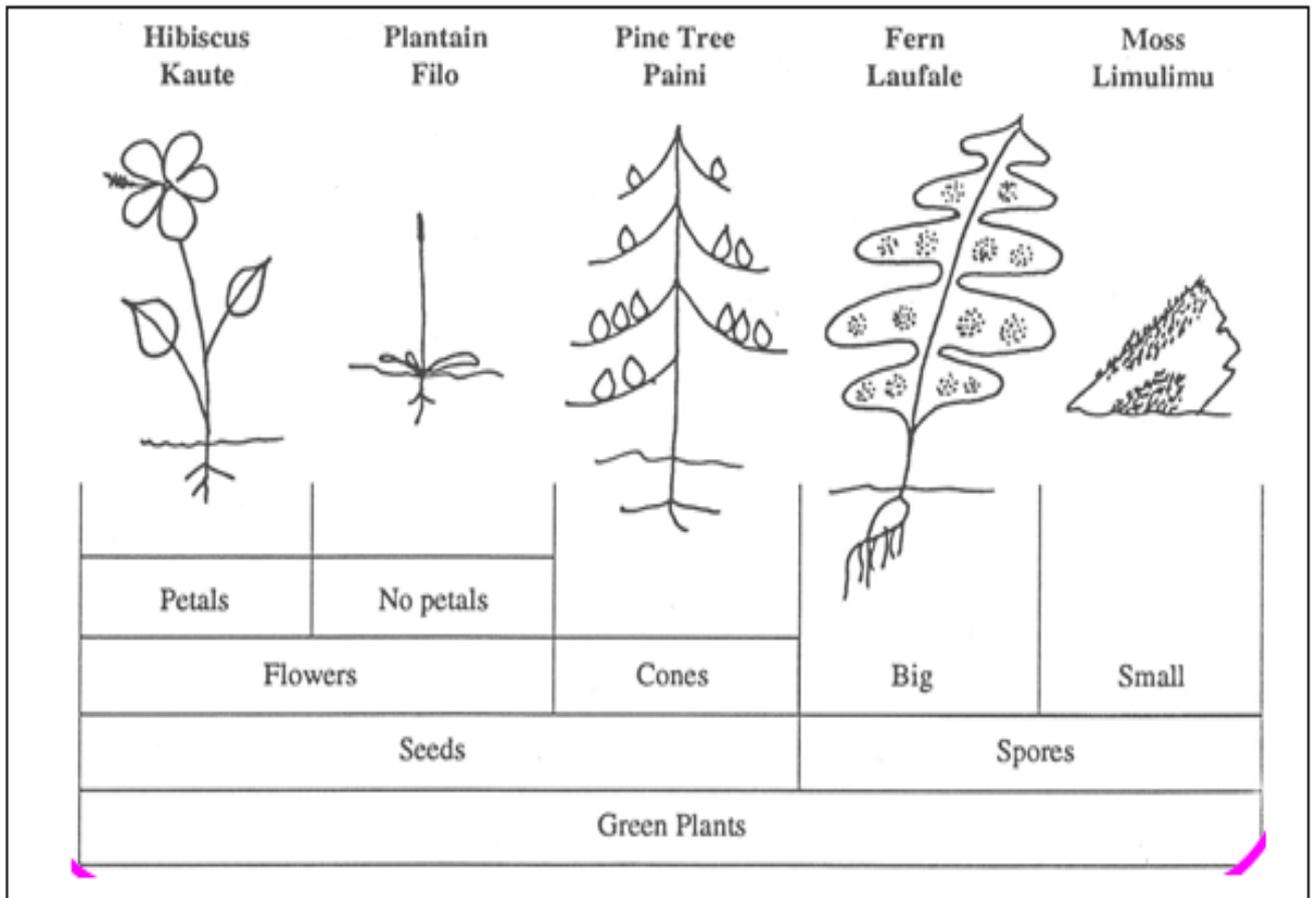
After this UNIT students should be able to:

Describe some features of living things, plants and animals in Tonga, two human body systems and related health issues.

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PLANTS IN TONGA

Classifying plants in Tonga



The KAUTE group (hibiscus)

- Have seeds, flower and petal

The FILO group (plantain)

- They have flowers but no petal

The PAINI group (pine tree)

- Have seeds but no flower. They have cones instead of flower.

The LAUFALE (fern)

- They have spores instead of seeds. Spores are easier for plants to make but they are not as good as seeds. In a seed, the baby plant is well developed, it has plenty of stored food and it has a strong waterproof coat.

The LIMULIMU (moss).

- Have spores instead of seed.

***seed is better than spore because seed has stored food, seed coat and well developed offspring.**

LEGUMES, MEDICINAL PLANTS, COMMERCIAL, and ORNAMENTAL PLANTS

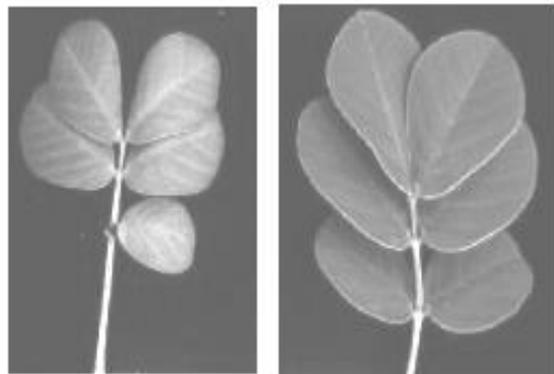
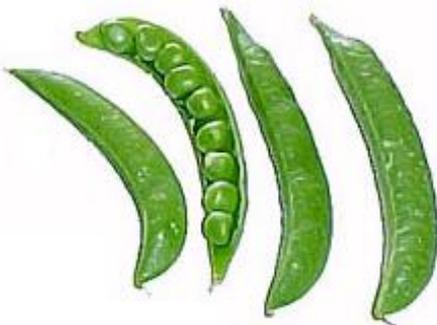
Legumes

Two types:

1. Butterfly flowers - big coloured petals and the flower is not usually round. Eg, fehi, 'ohai, te'epulu, ngatae, ifi, 'akauveli, clover, peas, bean.
2. Fluffy flowers - no petals and anthers stick out like fluff. Eg, mateloi, sialemohe, kasia, lopa.

The legumes

- Have lumps called **nodules** in their root which makes the soil more fertile.
- Fruit is a pod.
- They have leaflets
- Leaf has smooth edges.



Medicinal plants include hēhea, heilala, tamatama, lekileki, kihikihi, nonu and so forth.

- Plants that are used as medicine .

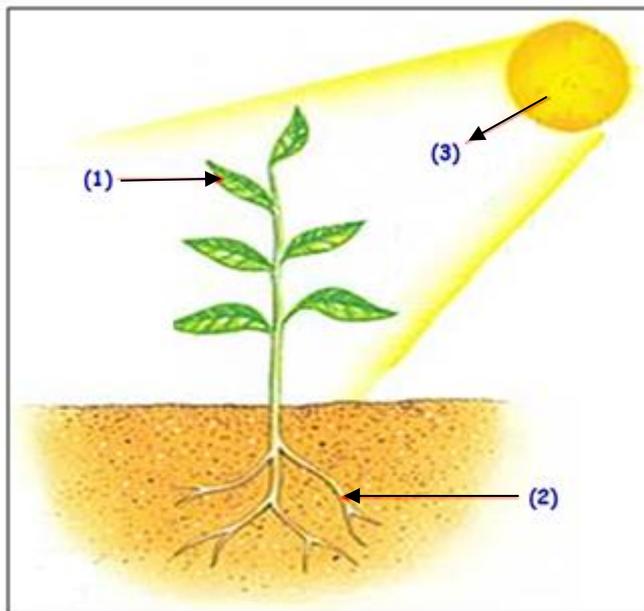
Ornamental plants include heilala, pua tonga, huni, siale, si, fā.

- Plants that are grown for decorative purposes and also used to make 'kakala' such as sisi and kahoa.

Commercial plants include nonu, kava, ahi, food crops that are exported, vanilla.

- Plants grown to sell for money and are often exported.

WHAT PLANTS NEED



The process in which plants make their own food is called **photosynthesis**. It happens in the leaf of plants in the chloroplast.

Plants need the followings:

1. Carbon dioxide
2. Water
3. Light
4. Chlorophyll

Carbon dioxide from the atmosphere enters through the small openings (stomata) of the leaf (underside of leaf).

Water enters the root hairs from the soil and are carried up to the leaves

Chlorophyll is a green pigment present in the leaves of plants which plays an important function by trapping light energy from the sun for photosynthesis.

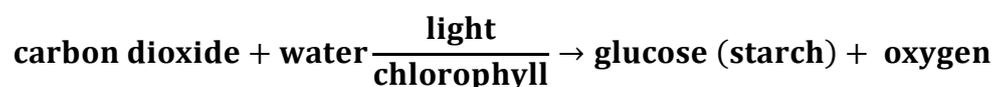
Light is from the sun and is trapped by the chlorophyll.

Two substances are produced which are:

1. **Glucose (starch)**
2. **Oxygen**

- Glucose is changed into starch and stored in plants while oxygen is diffuses out of the leaf and goes to atmosphere.

Word equation:



ECOSYSTEM

- **Ecosystem** refers to all plants and animals and their relationship with their environment.
- **Environment** refers to all the living (biotic) factors and the non-living (abiotic) factors.
- Living factors (**biotic**) include food, predators (organism that kills other organism for food), etc
- Non-living factors (**abiotic**) include light, temperature, soil types, wind, salinity (saltiness of sea), etc
- **Habitat** is the place where organism lives.
- **Adaptation** refers to the features of organism that help itself to survive in its environment for eg, wings of bird to fly (escape from enemies, find food etc), flowers of plants are colorful and scented (smell nice) to attract insects for pollination.

The Mangrove

Mangroves are also very important plants preventing shore erosion, feeding and birthing places for many marine organisms. They are also used for traditional activity like making tapa.



NAME OF ECOSYSTEM:MANGROVE ECOSYSTEM		
	Part of plant	How it uses the part for adaptation
Get food	Leaves	Leaves are arranged so that they will absorb more light from the sun.
Reproduce	Seed	Seeds are light and can float on water and can grow into new plant in other places.
Anchor in soil/sand	root	Very strong root to anchor the plant in soil and to withstand waves action.
Relation to other organisms	Root can be a habitat and shelter to other marine organisms.	

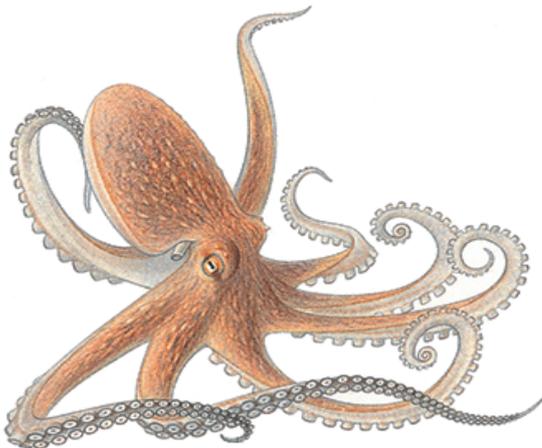
ANIMALS IN TONGA

- Pig, horse, etc
- You can pick one animal and identify the followings:

- + The name of the animal.
- + Its structure.
- + The group it belongs to.
- + Where it likes to live.
- + Its feeding habits.
- + Any special features about it.
- + Its adaptive features.
- + Reasons why it is important.

Example:

Name: OCTOPUS



Habitat: in the sea under the rocks

Structure: have 8 tentacles

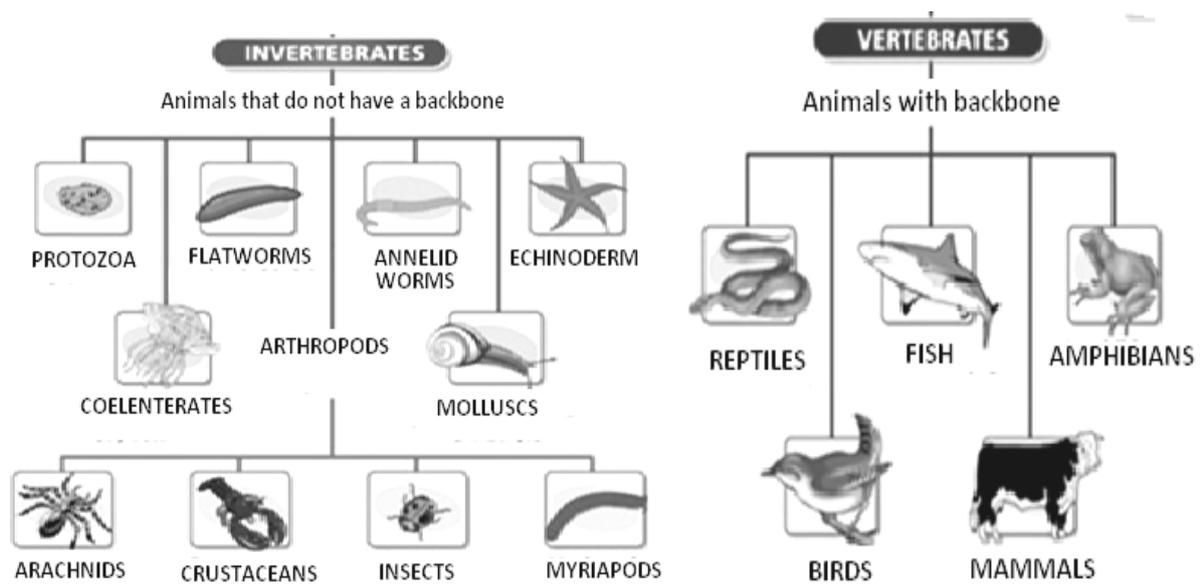
Group it belongs to: Invertebrate/ Mollusc

Feeding habits: use it tentacles to catch its food.

Adaptation: it head contains a dense cloud so that it when it try to escape from enemies, it release it to the environment so that the enemy won't catch them.

Reasons why important: important in our traditional food.

CLASSIFICATION OF ANIMALS



VERTEBRATES

1. Reptiles

- Have dry scaly skin, Lay eggs on dry land, Are cold blooded



2. Fish



- Have scales on their body, Have gills for breathing, Are cold blooded.

3. Amphibians



- Have moist slimy skin
- Lay eggs in water
- Are cold blooded

4. Birds

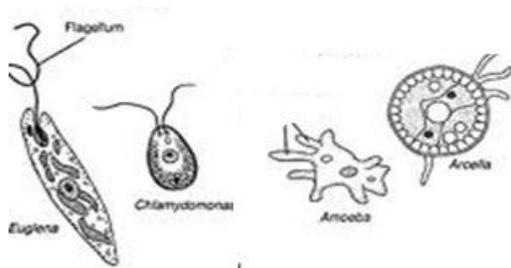
- Have feathers and wings, Lay eggs, Are warm blooded

5. Mammals

- Have fur or hairs, Feed youngs on milk, Are warm blooded
Eg cow and human

INVERTEBRATES

1. Protozoa



- Single cell organism (unicellular), All microscopic.

2. Flatworms



- Soft body

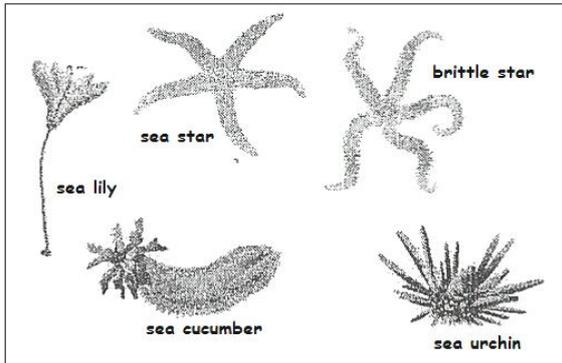
3. Annelids

- Have segmented body



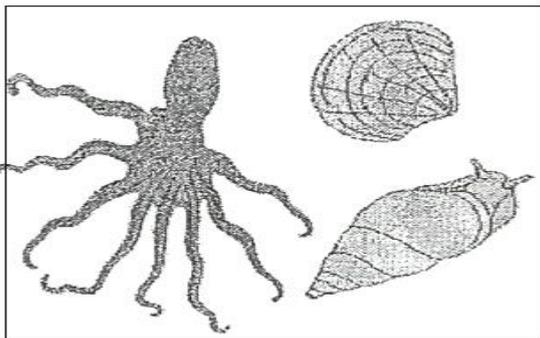
4. Echinoderms

- Most are spiny body eg sea urchin
- Have thousands of tube feet to help them move eg, sea star

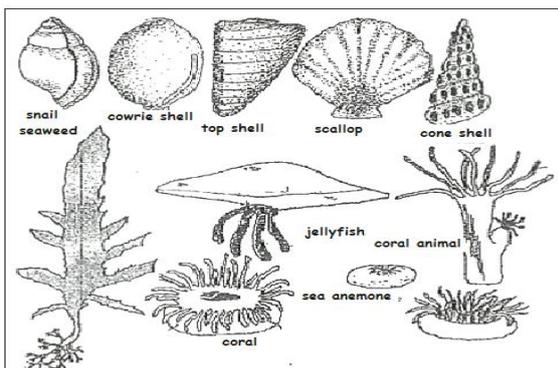


5. Mollusc

- Most have shells
- Have muscular foot



6. Coelenterates



- Most have soft body such as sea anemone and jellyfish
- Have tentacles eg jellyfish
- They have stinging cells eg coral
- Some have shells

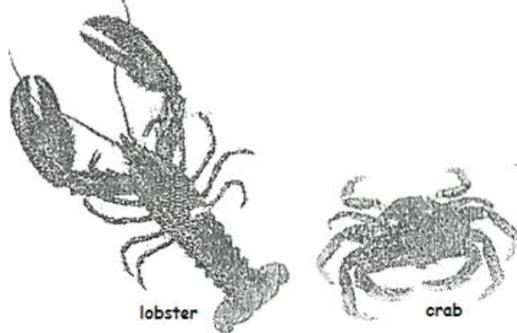
7. Arthropods

i. Arachnids

- Have two body parts and have eight legs, No antenna, Eg, spider and scorpio



ii. Crustaceans



- Have two large claws use to catch food.
- Have hard exoskeleton (for protection)
- They have gills for breathing.

iii. Mariapods

- Many pair of legs and body are segmented.
- Eg, centipede and millipede.

iv. Insects

- Have 3 body parts
- One pair of antennae
- 3 pairs of legs

Eg, mosquito, butterfly



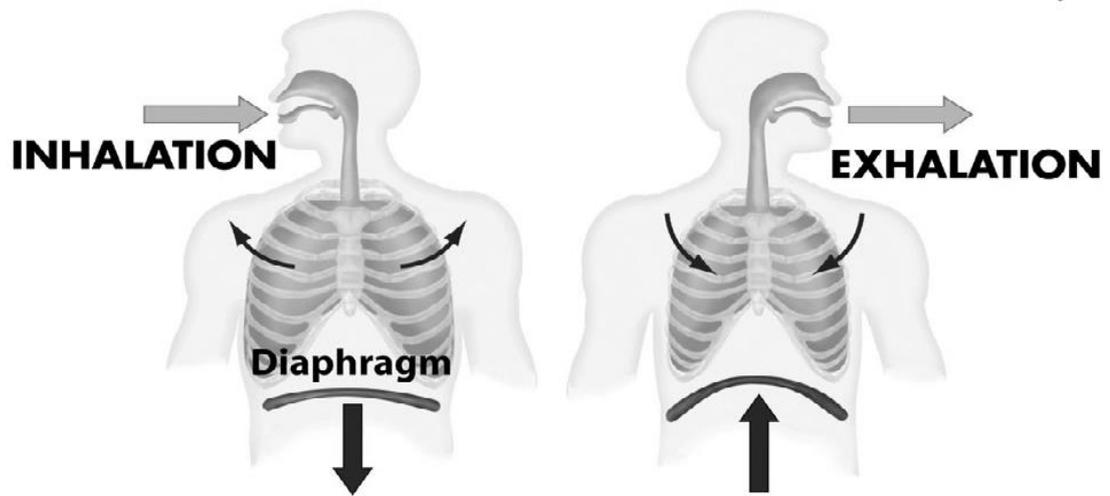
RESPIRATORY SYSTEM

There are **3 processes** happen in the respiratory system.

1. Breathing
2. Gas exchange
3. Respiration

BREATHING

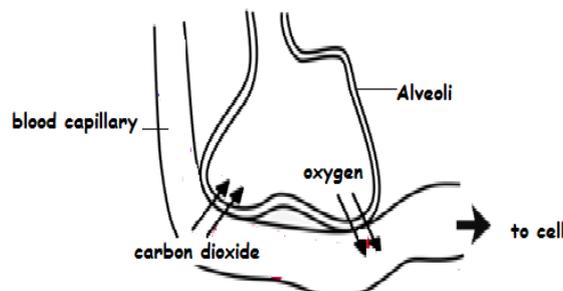
- This is the process of inhaling and exhaling of air.



- During inhalation, the diaphragm contract and moves down while the ribs moves up and out. This increase the volume of the chest for the air to fill the lungs.
- During exhalation air is forced out of the lungs. The diaphragm relaxes and moves up while the chest moves down and in.

GAS EXCHANGE

- Gas exchange happens in the alveoli. Carbon dioxide diffuses from the blood capillaries into the alveoli to be taken out as a waste product of respiration and oxygen diffuses from the alveoli to the blood capillaries to be taken to cells for the process of respiration.



RESPIRATION

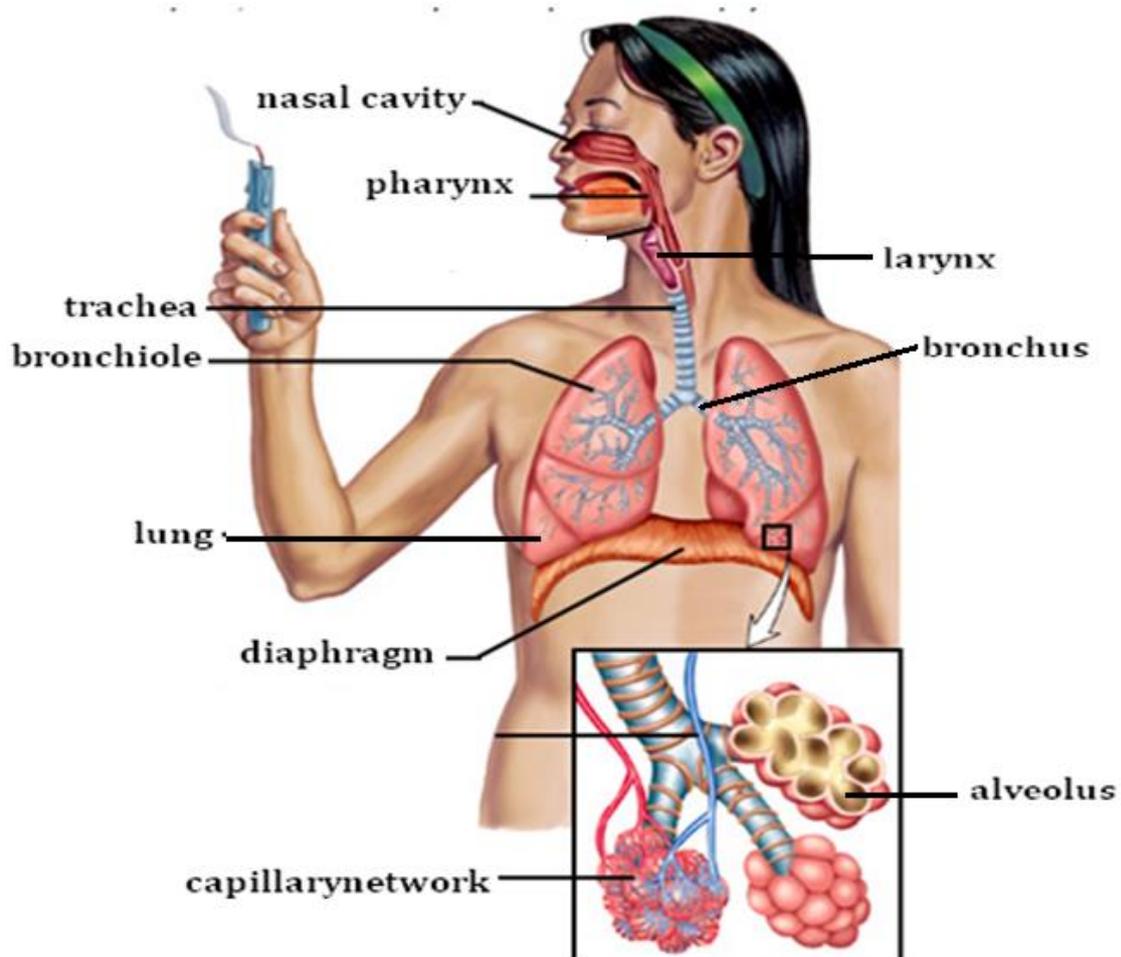
- Respiration is the breakdown of food involving oxygen to release energy. This happens in the MITOCHONDRIA of cell.

The word equation for the process is



- Glucose is from the food that we eat, oxygen is obtained from the atmosphere. The product of respiration is water, carbon dioxide and energy. Energy is in the form of ATP which then used for body needs such as movement etc. water is then reabsorbed by the body or comes out in perspiration and carbon dioxide is a waste product and will be taken out.

THE RESPIRATORY SYSTEM

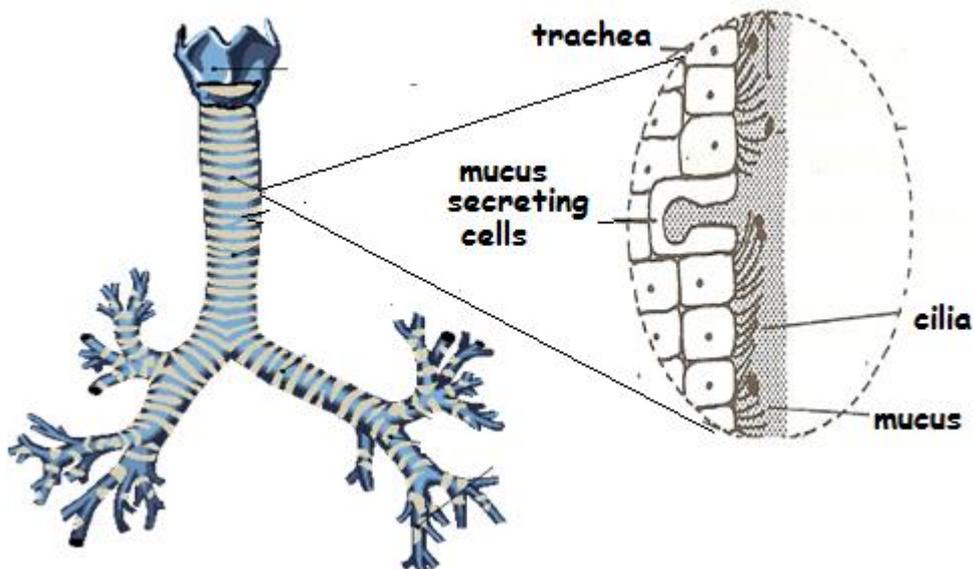


NOSE- the nose moistens the air that is breathed in. it also has hairs to trap the dust.

PHARYNX- air travels from mouth and nose into the pharynx.

LARYNX- chamber at the top of the trachea and function as the voice box. It contains a pair of vocal chords which vibrate when air passes them. This produces sound.

TRACHEA: It is lined with mucus and cilia that help remove dust particles and bacteria back up to the mouth and nose.



BRONCHI: (singular: bronchus) these are the two tubes that branched off the trachea and lead into the lungs.

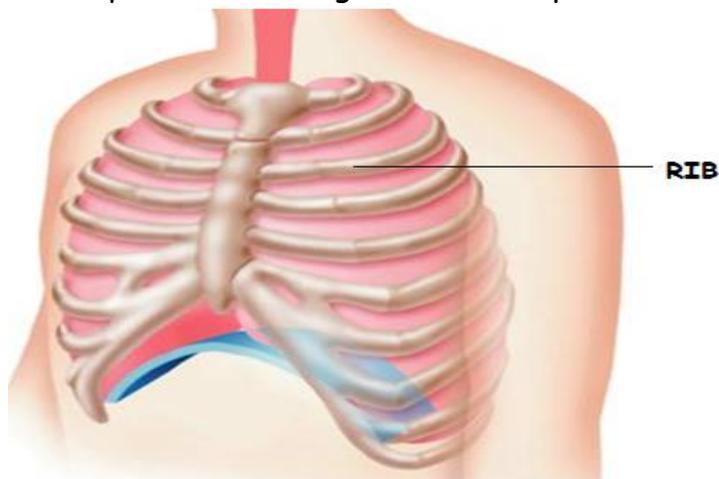
BRONCHIOLES: the smaller tubes that extend throughout the lungs.

ALVEOLI: (singular: alveolus): air pockets that are found at the end of the bronchioles. It is the place that gas exchange occurs. These are clusters of air sacs. In human's adult, there are approximately 300 million alveoli.

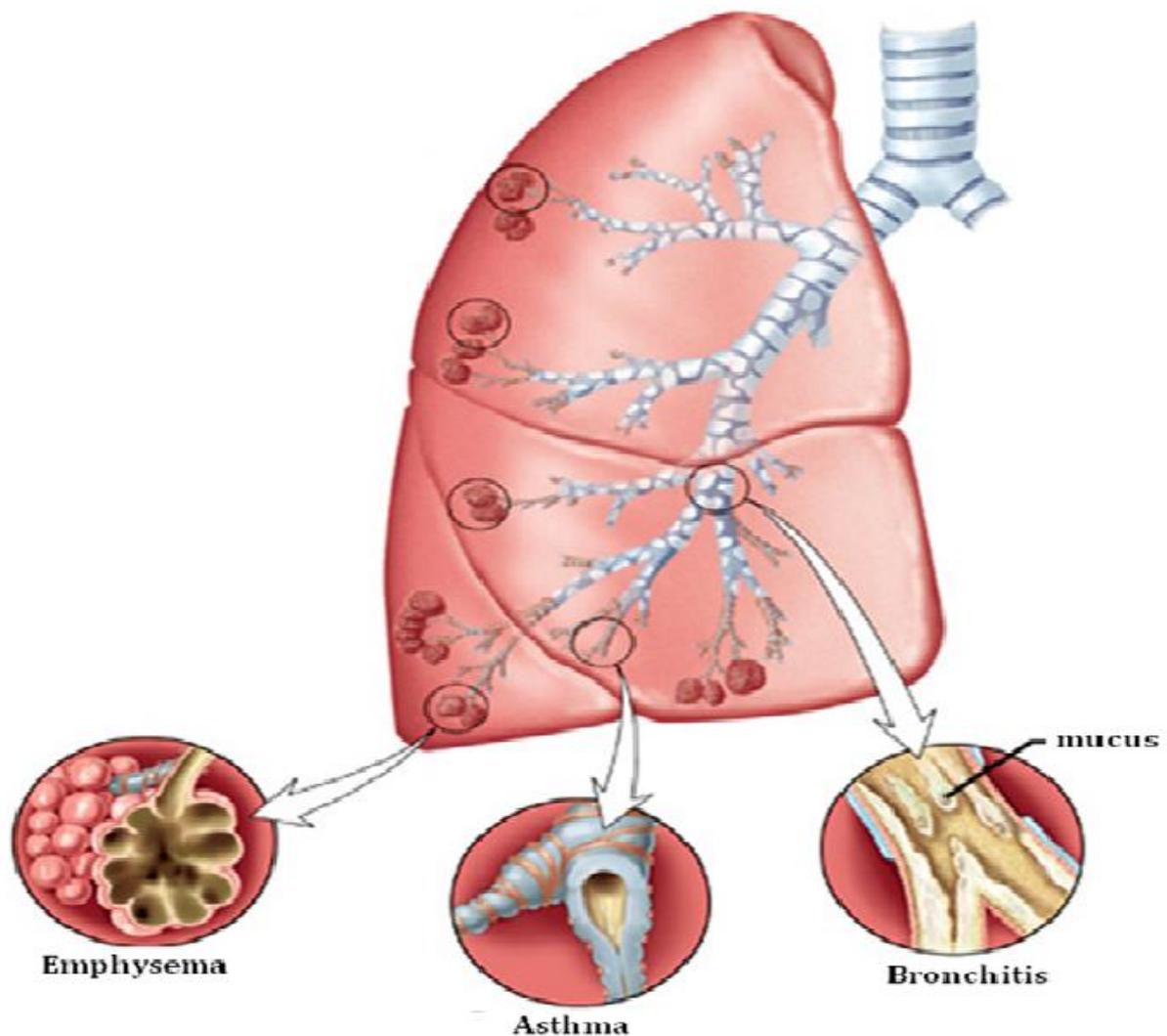
LUNGS: there are 2 lungs. It is the site of gas exchange.

DIAPHRAGM: It assist in breathing.

RIBS: protect the lungs and also help in breathing.

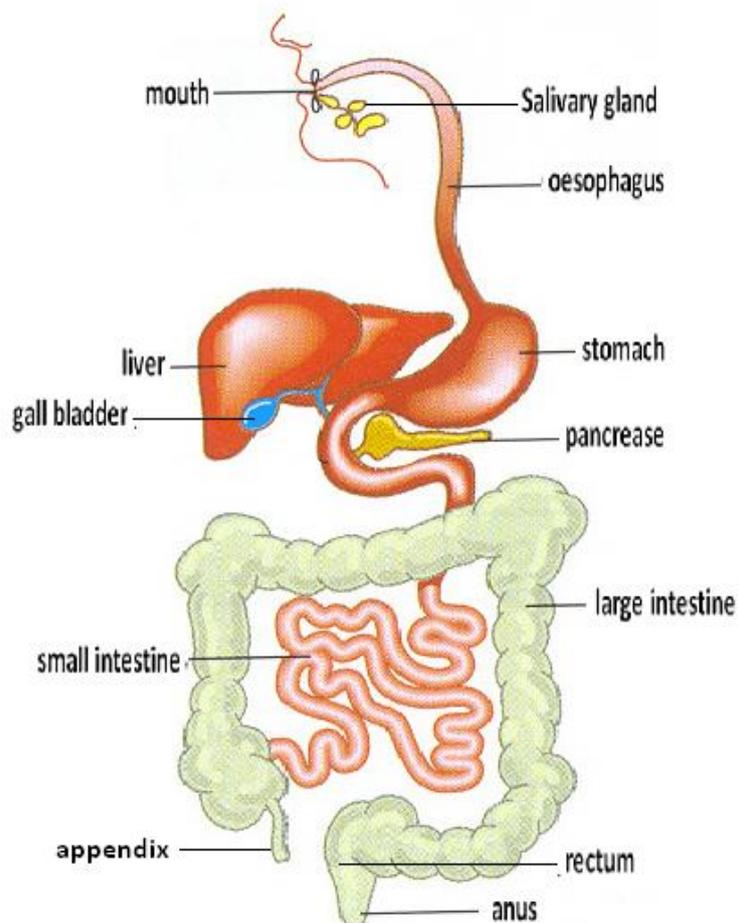


DISEASES OF THE RESPIRATORY SYSTEM



1. **Asthma**: Condition in which breathing is difficult, cough, and thick mucus secretions
Causes: Attacks may be due to inhalation of allergens (e.g.: pollen, cats, and cockroach proteins), pollutants, infection, or emotional stress.
Treatment: (e.g.: immuno-suppressors, bronchodilators), but is not a cure.
2. **Bronchitis**: Inflammation of the mucous membranes of the bronchi. May present with cough, fever, chest or back pain, and fatigue.
Causes: Associated with smoking, pollution, and bacterial or viral infections.
3. **Emphysema**: Permanent destruction of alveolar walls, resulting in loss of lung elasticity and gas exchange surface.
Symptoms include shortness of breath, difficulty exhaling, cough, weakness, anxiety, confusion, heart failure, lung edema (swelling), and respiratory failure.
Causes: *Smoking*, pollution, old age, and infections.
Treatment: Oxygen to help breathing. No cure.

DIGESTIVE SYSTEM



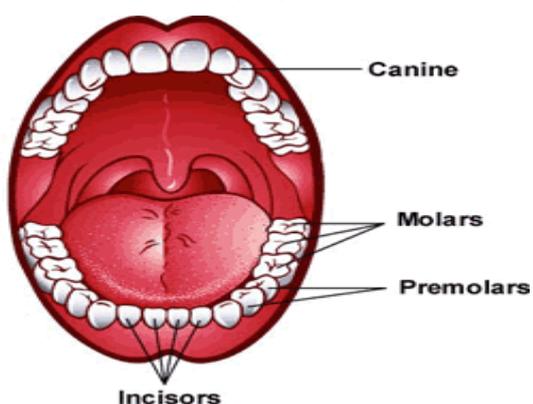
- The digestive system is concerned with *processing food so that it can be made available to the cells of the body. The **breakdown** of large **molecules** (food) into small **soluble** molecules* is called digestion.

Physical digestion (mechanical digestion): done by the teeth in which it breaks down food into smaller pieces.

Chemical digestion: breaking down of food involves enzymes and stomach acid.

THE MOUTH

- food is broken up by the teeth and mix with saliva by the tongue. There are 3 types

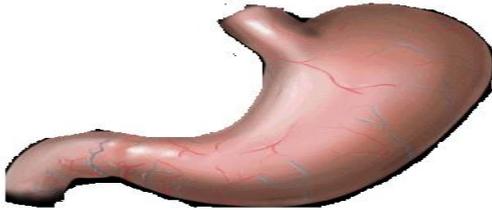


- of teeth in human which is the
- ✓ incisors - the cutting and chopping food.
- ✓ canines - tearing teeth
- ✓ molars - grinding and mashing food.
- ✓ Premolars - crushing and grinding food.

-saliva is secreted by the salivary glands. It lubricates the food making it easier to swallow. It also contains an enzyme called **amylase** which digests the starch.

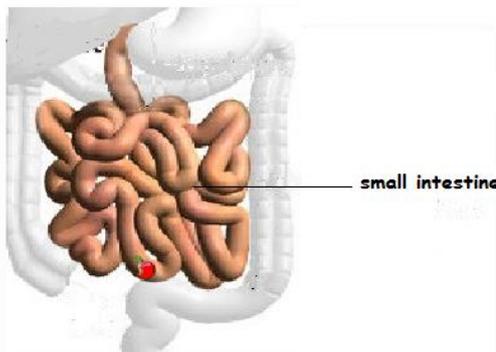
- The tongue roll the chewed food into a ball called a bolus which can be easily swallowed
- The bolus (chewed food) is forced down the oesophagus to the stomach by wave like contraction of muscle in the wall of oesophagus.

THE STOMACH



- The wall of the stomach contains the enzyme **pepsin** which breaks down protein.
- It also contains an acid called **Hydrochloric acid** that can kill bacteria that present in food.
- The stomach wall secretes mucus which protects it from the acid. When the acid eats into the wall of the stomach or the first part of the small intestine, it causes '**ulcer**'.

SMALL INTESTINE



- Most of the digestion happens in the small intestine
- The product of digestion are then absorbed in the second part of the small intestine.

PANCREAS



- Pancreas secrete the enzyme **amylase** that break down starch, **lipase** that break down fats and **trypsin** which digested protein into the small intestine.
- **Bile** is a green liquid that is produced in the liver stored in the gall bladder and pass down to mix with the food entering the small intestine.
- Bile help break down fats and change the acidity of chyme.

LARGE INTESTINES/ COLON

- Water is absorbed in the large intestine. The waste as faeces is egested through the anus.

MALFUNCTION OF THE DIGESTIVE SYSTEM

1. **Peptic Ulcer:** the lining of the stomach or the duodenum is broken. Most commonly affects the stomach (gastric ulcer). and duodenum - both diseases are painful. The cause seems to be the stomach or the duodenum cannot be able to protect itself against gastric juice so part of the gut begins to digest itself. Alcohols also contribute to ulcers.
2. **Gallstones:** Cholesterol is normally soluble in bile. but if its concentration in the gall bladder rises too high it may precipitate as solid lumps. This stone produces pain. It can be removed by surgery, but now the stones can often be removed by shattering them with high sound vibrations.
3. **Appendicitis:** The appendix has no known function but it can become infected and swollen causing appendicitis.. The symptoms are usually pain and fever and it can be treated by removing the appendix. If there is a delay the appendix may burst releasing huge numbers of bacteria into the body cavity. This is life threatening if not treated urgently with antibiotics.