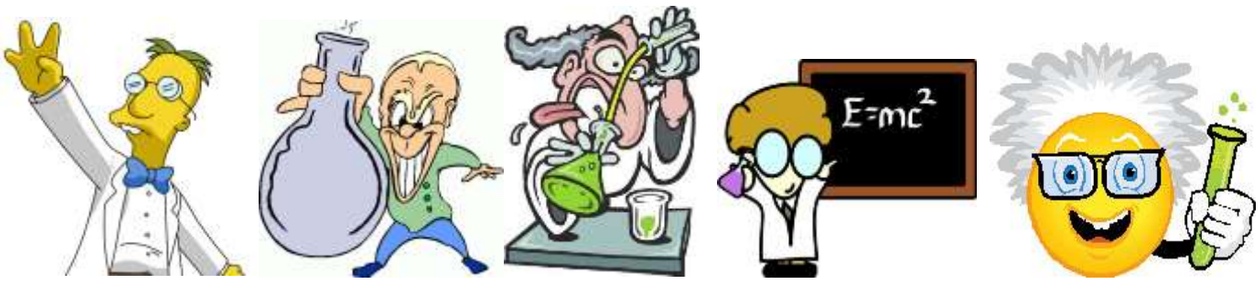


Dear Student,

The Teachers of the Science Department all wish to say "Welcome to Christ Church Foundation School". By the time we meet you next term we want you to be prepared for your future in science here, so we have a little task for you before you reach us.

Contrary to popular belief, not all scientists are mad! Please do some research on 2 of the scientists listed below, choosing 1 Barbadian and 1 Regional scientist, and complete the table showing the information which you find on the back of this sheet.

Andre Cropper

Dr. Cardinal Warde

Dr Juliette Daniel

Thomas Lecky

Carlton Cummins

Prof. Oliver Headley

Dr Nicholas Brathwaite

Dr Wayne Greaves

George Moon Sammy

Name _____ Form _____

	BARBADIAN SCIENTIST	REGIONAL SCIENTIST
NAME Eg.. Prof Louis Grant		
NATIONALITY Jamaican		
EDUCATIONAL BACKGROUND Secondary school at Jamaica College later studied at Edinburgh University in Scotland		
TYPE OF SCIENTIST Microbiologist		
BEST KNOWN ACHIEVEMENT Identified and eradicated different diseases .		
IMPACT ON SOCIETY Got rid of tuberculosis, reduced the number of cases of leptospirosis, and helped to reduce the spread of dengue fever in Jamaica		
OTHER SPECIAL INTEREST Music & Providing low cost public health for the poor in Jamaica		

By now if you have shown the following;

1 You can research and find out things for yourself.
2 You can report your findings neatly.
3 You are responsible and can keep your work safely.
4 You are punctual and able to present your work on time.
5 You know which scientist also went to school at CCFS

You are off to a **GREAT START!** **CONGRATULATIONS !**

WHAT IS INTEGRATED SCIENCE ?

THE PIECES OF THE PUZZLE OF THE WORLD AROUND US AT

CHRIST CHURCH FOUNDATION SCHOOL!

WHAT IS SCIENCE?

Definition

Branches of Science

Examples of each branch

Explanation of Integrated Science

WHO ARE SCIENTISTS?

Common concepts of scientists

Examples of well- known historic scientists

Realistic recognition of scientists

Identification of Local & Regional modern –day scientists

WHERE IS SCIENCE DONE?

Develop appreciation of the open laboratory as opposed to the traditional science lab

WHAT PURPOSE DOES SCIENCE SERVE?

Develop appreciation of the impact of understanding the world to our ability to manipulate it and utilize what it offer us, and how it can be used to protect or benefit us.

Present idea that once there is an understanding of how things work, then we can either improve on it, or prevent it if it causes us a problem, or put it to use to benefit us.

WHAT IS TECHNOLOGY?

Open up the understanding to get rid of the notion that technology only refers to electronic /electrical equipment. Include processes in addition to things;

Eg. Immunizations, Internet, genetic engeneering, food processing, solar- powered machines

THE CHAIN OF COMMAND ie. WHICH CAME FIRST?

Science → Technology → Greater discoveries in Science →Newer technologies …… It never ends.

It is now unlikely to see science in action without the use of some forms of technology however basic.

HOW DOES A SCIENTIST WORK?

They must use the senses which the have to safely OBSERVE their surroundings. Safest are SIGHT,HEARING,& SMELL . Touch is sometimes risky ! WHY? TASTE is also risky! WHY?

They must come up with explanations for what they observe using an educated guess. Ie. HYPOTHESIZE

They must EXPERIMENT , (sometimes after DESIGNING or PLANNING the experiment,) by taking MEASUREMENTS and by MANIPULATING things.

They have to RECORD their findings, and then REPORT on the experiment in-order to share their findings with the rest of the world. Some even have to DRAW to show their findings. Like who?

DO SCIENTIST ALL USE THE SAME BASIC METHOD?

A systematic and logical approach is always followed. It has about 10 steps and is called the

SCIENTIFIC METHOD.

Problem Statement- Hypothesis –Plan / Design – Experiment – Analyse results –Redesign if needed-Repeat experiment-Coonclusions

ARE THE SAME STANDARDS USED EVERYWHERE?

It is very important that everyone follows the same rules because then they can compare their findings in a fair manner, and also use each other's findings to help their investigations. This leads to several STANDARDS.

Eg. SI Units of measurement , the GHS of labelling and hazard and safety symbols, common safety rules and dress regulations for the Laboratory.

Examples of SI Units are:

Show at least TWO Examples of GHS (Globally Harmonized Symbols) here .

Identify 2 Lab Safety Rules, and 2 Laboratory Dress regulations here.

SAFETY FIRST! WHAT ARE THE HAZARDS & THE RULES?

Negligent or improper use of equipment. Eg. Sharp blades, Electrical shock,

Dangerous materials eg. Flammable of poisonous or corrosive, or cancer causing.

Delinquent and reckless or irresponsible behaviour can't be tolerated from scientists.

WHY DO SCIENTISTS USUALLY FEEL THEY ARE RIGHT?

When experiments are carried out carefully, and precisely, the results can be trusted. BUT…

Observations can be inaccurate because our senses sometimes get tricked eg. Optical illusions.

Check for some of these Amazing Illusions at https://youtu.be/bz7hj_YC3j0

Instruments however don't get tricked, so they can be used to make accurate observations and measurements.

Once scientists stick to the rules they can compare results and combine data to check their findings.

WHAT QUANTITIES DO THEY HAVE TO MEASURE?

Length in m Mass in g Temperature in ^{o}C Time in s Volume in l

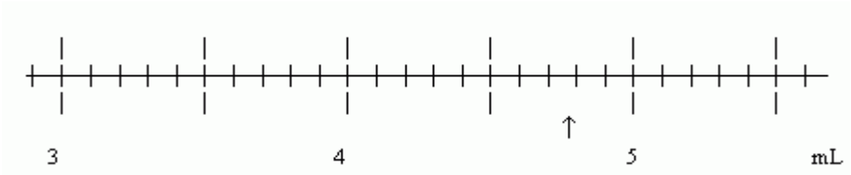
Each of these needs a special instrument, which depends also on the amount being measured.

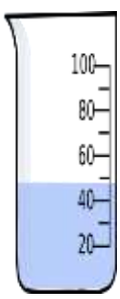
Name one instrument which could be used to measure the quantity stated above in each case.

Length Mass Time

Temperature Volume

Each instrument must be used correctly, and the scale interpreted correctly depending on its graduations (ie. Spacings on the scale). What does each graduation below represent on the scales shown?





(Of course later on there will be other quantities to be measured, and new instruments and units too.)

FIRST FORM MODULE 2

As you study this module should make your own notes that cover all of the topics listed below,

When you revise your notes make sure that you can answer the following questions.

1. What is Matter? How many states of matter are there? What are the states?
2. List the characteristics of EACH state of matter.
3. Describe how particles are arranged and how they behave in each state of matter. Also draw diagrams to show this.
4. Explain what causes changes in state. Give the NAMES of ALL the changes of state. Write an example of an everyday occurrence for each change of state.
5. Describe what happens to the particles in terms of arrangement and movement, while EACH change of state takes place.
6. Give the characteristic properties of water which make it special.
7. Outline the stages that occur in the Water Cycle in nature .
8. Give 2 reasons why the Water Cycle is important.
9. List 3 ways in which people waste water. List 3 ways in which people conserve water. State how water conservation helps a country.
10. Discuss how water is used in food preparation.
11. In each of the following cases, state what property allows water to be used in that way;
    As a habitat , For Recreation, For Transport, For cleaning
12. Name 2 TYPES of Mixtures, and describe the properties of each.. Define the following terms;
    Solute, solvent, filtrate and residue.
13. Describe a method used to separate each of the Mixtures identified above.
14. Distinguish between the characteristics of METALS and NON-METALS.
15. Define the term ALLOY. Give named examples of 2 alloys, and state what they are used for.
16. Explain why man developed alloys, and show how he benefitted.
17. What is RUSTING? Write a simple word equation to represent rusting.
18. State the conditions needed for rusting to occur, and state different techniques that can be used to prevent rusting.
19. Is Rusting a Physical or a Chemical Change? How are these two types of changes different?
20. Identify 2 different examples for EACH type of change that occur in everyday life.
21. Classify the changes that occur when baking a cake.
22. Classify the following methods of removing stains as Physical or Chemical Changes;
    Rubbing out mud, Bleaching grass stains, Dissolving ink in alcohol, Rubbing chewing gum with ice and scraping it off, Blood stains bubbling and disappearing when treated with hydrogen peroxide.
23. The final section deals with ACIDS and BASES

MODULE 2 ANALYSIS SBA WORKSHEET 2016

NAME _____ FORM _____

AIM: To determine the characteristic tastes of foods classified as Acidic, Basic or Neutral .

Complete the table below after observing the effects of the different substances on Litmus paper.

SUBSTANCE	TASTE	EFFECT ON BLUE LITMUS	EFFECT ON RED LITMUS	CLASSIFICATION
Mauby bitters	Bitter			
Lime juice	Sour			
Vodka Alcohol	Neither of above			
Baking soda solution	Bitter			
Vinegar	Sour			
Orange juice	Sour			
Water	Neither of above			

Now complete this table to show what you notice about the taste, effect on litmus, and the classification given to substances.

TASTE	EFFECT ON LITMUS	CLASSIFICATION OF SUBSTANCE
Sour		
Bitter		
Neither of the above		

Use the information above to predict the following.

What would a *Bajan* cherry do to litmus paper?

_____

What would Angostura bitters do to litmus paper? _____

A medicine called VIVA turns red litmus paper blue, what taste would you expect it to have? _____

CONCLUSION: What can you say about the purpose served by litmus paper?

_____

NAME: _____ FORM: _____

You have been hired by Alpha Investigations Unit (AIU) as Forensic Scientist. AIU has gathered some evidence from suspects A, B and C, and from the crime scene. The guilty person used a substance with a low pH to commit the crime.

Your aim, young scientist, is to determine whether each substance, is an acidic substance, an alkaline substance or a neutral substance so that AIU can make their arrest.

Instructions: Carry out the tests as shown in the table below and record your observations.

Test to be carried out on substance	**Observations**
Place two drops of the substance from Suspect A into one slot of a spotting tile. Place a strip of blue litmus paper into that slot. Record your observations.	
Place two drops of the substance from Suspect B into one slot of a spotting tile. Place a strip of blue litmus paper into that slot. Record your observations.	
Place two drops of the substance from Suspect C into one slot of a spotting tile. Place a strip of blue litmus paper into that slot. Record your observations.	
Place two drops of the substance from Suspect A into one slot of a spotting tile. Place a strip of red litmus paper into that slot. Record your observations.	
Place two drops of the substance from Suspect B into one slot of a spotting tile. Place a strip of red litmus paper into that slot. Record your observations.	
Place two drops of the substance from Suspect C into one slot of a spotting tile. Place a strip of red litmus paper into that slot. Record your observations.	
Place two drops of the substance from Suspect A into one slot of a spotting tile. Place a strip of universal indicator paper into that slot. Record your observations.	
Place two drops of the substance from Suspect B into one slot of a spotting tile. Place a strip of universal indicator paper into that slot. Record your observations.	
Place two drops of the substance from Suspect C into one slot of a spotting tile. Place a strip of universal indicator paper into that slot. Record your observations.	

Discussion:

1) What are TWO properties of acids which make them different from alkalis?

_____

_____

2) What are TWO properties of alkalis which make them different from acids?

_____

_____

3) What is meant by a neutral substance?

_____

_____

_____

4) Which substance was an acid?

_____

5) How can you tell?

_____

_____

_____

6) Which substance was an alkali?

_____

7) How can you tell?

_____

_____

_____

8) Which substance was a neutral substance?

_____

9) How can you tell?

_____

_____

_____

Predict which suspect, A, B or C will be arrested by AIU, based on your results.

_____

Why is this suspect guilty?

_____

_____

Conclusion:

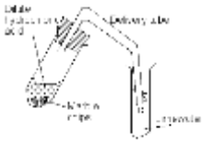
What was the nature (acidic, alkaline or neutral) of the substances from suspects A, B and C?

_____

_____

My Reflective Piece on All about Matter Module 2

Name: _____

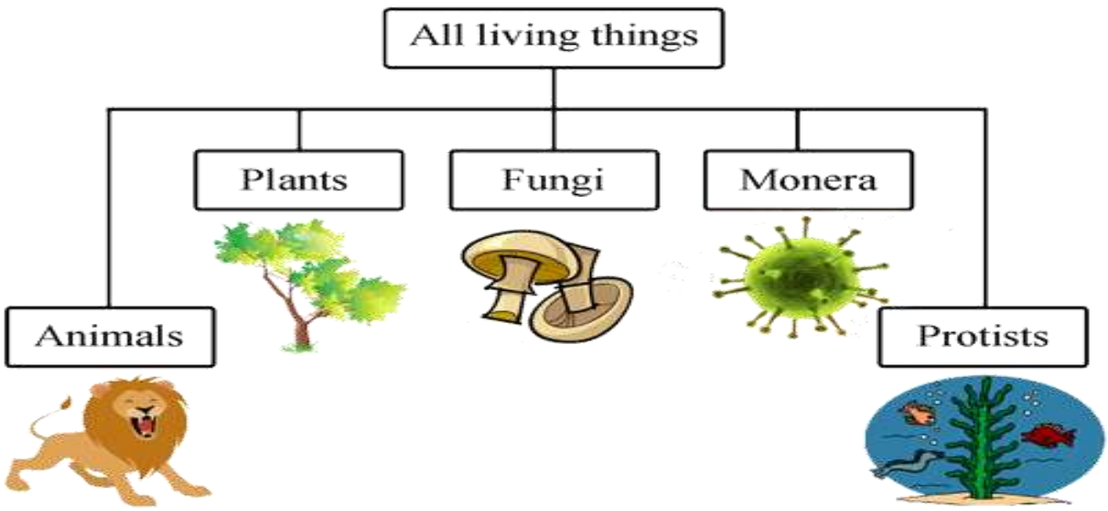


1.

the **Thought Cloud** above, describe two things that you now understand much better because of something you have learnt about matter, and show how they apply in real life, or how they can have an impact on your life.

Eg. I learnt that matter is made up of tiny, energetic, particles that are arranged in different ways. Now I understand why jello is a wobbly solid because its particles still have energy to shake even though they are fixed in position to remain as a solid, but if it warms up the particles start to move around and then the jello will start to flow as a liquid.

MODULE 3: LIVING THINGS



1. Characteristics

- What 7 characteristics do these all have in common?
  Hint: Remember MRS GREN!

2. Classification

- Take a 5min Fact Finding Walk, and make a list of 10 things making sure you have a balance of Living and Non-Living things.
- Dig you see any fungi, if so where was it?
- Bacteria are Monera, did you see any? Explain that answer
- Mold & Slime are Protist, did you see any? If so where was it?

3. At this point our focus if on PLANTS & ANNIMALS only.

- Study the differences between these two groups of things, and then write a comparison of their characteristics.

4. Now look only at ANNIMALS

- Determine the differences between VERTEBRATES & INVERTEBRATES.

5. Now look at the VERTEBRATES alone.

- Identify the 5 types, and state the characteristics of each type, and name 2 examples of each type.
- Identify the characteristics which you notice are common to any of the groups.
- Draw a Venn diagram to show how these groups are connected by their characteristics.

6. Looking at INVERTEBRATE

- Distinguish between INSECTS & NON-INSECTS by identifying the 7 characteristics of an insect.
- Think of 10 “creepy crawlies”, and identify which of them are Insects.

7. Insect Life Cycles

- Locate some insect eggs and document how they develop over time.

8. Types of Life cycles ie. METAMORPHOSIS

- Distinguish between COMPLETE & INCOMPLETE METAMORPHOSIS
- Draw diagrams and clearly label each stage in the cycles.
- Name 3 insects which go through each type of life cycle.

9. Looking now at USEFUL ANIMALS only

- What is the definition of LIVESTOCK?
- Name 4 types of benefits which we try to get from livestock.

10. IMPORTANCE of livestock to man.

- Explain why keeping livestock is so important to man considering there are so many wild animals around.

11. ANIMAL PRODUCTS

- Pigs, Sheep, Cows, Goats, Chickens, Turkeys & Ducks, are kept as livestock. Create a Chart/or flyer showing 3 important items which can be obtained from each type of animal, which you think would encourage young people to take up animal husbandry as a way to earn some income,

What Are Insects?

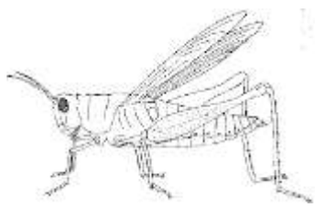
The animal kingdom is divided into several groups called phyla (singular = phylum). Insects belong to the phylum Arthropoda. The Arthropoda is divided into a number of classes, one of which is insecta (insects).

Insect features

There are some general features that insects possess which are listed below:

- The insect body is divided into three main parts, the head, thorax and abdomen.
- Insects have no internal skeleton, instead they are covered in an external shell (exoskeleton) that protects their soft internal organs.
- No insect has more than three pairs of legs (six legs), except for some immature forms such as caterpillars that have prolegs. These are appendages that serve the purpose of legs.
- Insects have one pair of antennae.
- Most insects have one or two pairs of wings although some insects such as lice, fleas, bristletails and silverfish are completely wingless.

Activity: Circle the organisms below which are insects

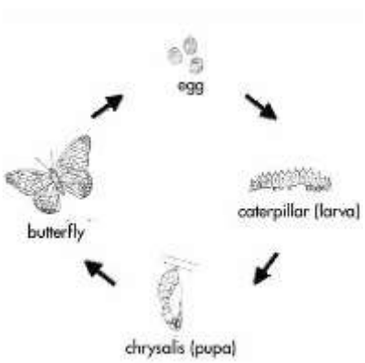



Metamorphosis

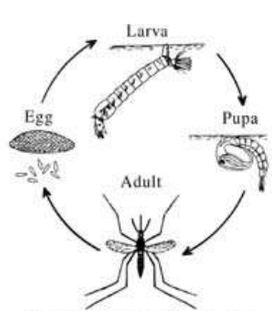
Metamorphosis is defined in science as a major change that occurs in most insects' (or some animals such as frogs) form or structure as it becomes an adult.

There are two types of metamorphosis:

1. Complete metamorphosis – this has four distinct stages in the life cycle of the insect in following sequence: egg, larva, pupa, and adult. Eggs from a mated female hatch into the larval stage. Usually, larvae are completely different from the adults in such features as their shape, size and food habits. The larvae are very active and voracious feeders in preparation for the next stage. Larvae make a cocoon around them and stay still and inactive inside without eating and moving – this is their pupal stage. The pupae become adults after completion of their development and emerge from the cocoon.



The life cycle of a butterfly



The life cycle of a mosquito

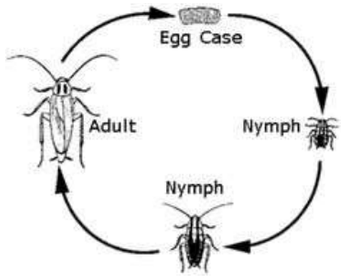
Activity: List three more insects that undergo complete metamorphosis.

a) _____

b) _____

c) _____

2. Incomplete metamorphosis – this has three stages in the life cycle of the insect: eggs, nymph, adult (there is no pupal stage). When the eggs hatch, nymphs emerge which look mostly like adults, but smaller in size, wingless, and their food habits are the same as adults. As the nymphs develop, they shed their exoskeleton to allow the body to grow large. When they reach the adult stage, moulting stops.



Life cycle of a cockroach

Activity: List two more insects that undergo incomplete metamorphosis.

a) _____

b) _____

LIVESTOCK PROJECT – DUE ON …..Insert Date here _____

Requirements:

- ✓ This project can be submitted as a pamphlet or as a booklet on 8½ x 11 paper
- ✓ The project should include the following:
  - A cover page which has the title of the project, your name and any other relevant information (such as a picture of livestock).
  - An introduction which gives a definition of livestock and a brief, general description of the importance of livestock to Man.
  - The names of any THREE livestock (choose from the following: pig, sheep, cow, goat, chicken, turkey, duck) and give written descriptions of THREE uses of EACH livestock mentioned. A picture of EACH livestock and where possible, a picture of what they are used for.
  - Name each section of the project followed by the relevant information in that section, for example, Introduction; Sheep (if this is one of the livestock that you prefer to write on, etc).
- ✓ The project may be typed or neatly hand written.

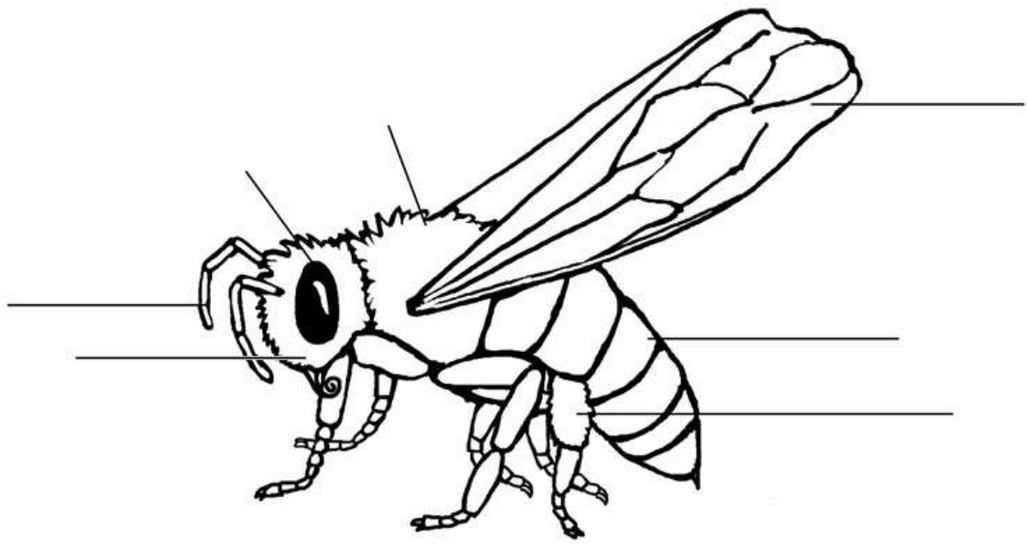
NAME: _____ FORM: _____

DATE: _____

MODULE 3

INSECTS

Instructions: Label the insect below.



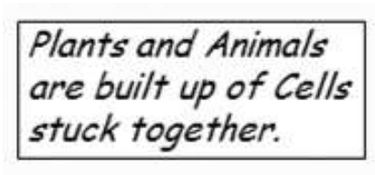
Use the words below to fill in the blanks. Each word can be used once, more than once or not at all.

abdomen	head	thorax	wings
	compound	invertebrates	three-part
	external	six	two

Insects are _____ which have:

- _____ legs,
- an _____ skeleton,
- _____ eyes,
- _____ antennae,
- a _____ body consisting of a _____, a _____ and an _____.

Some insects also have one or two pairs of _____

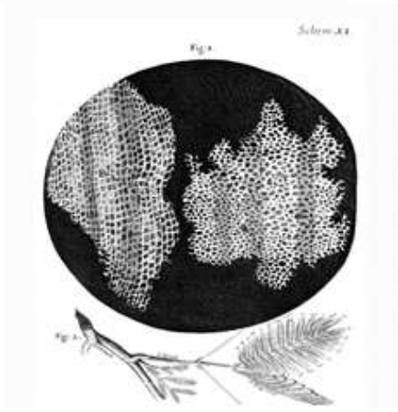


All living organisms are composed of cells.

- But what exactly is a cell?

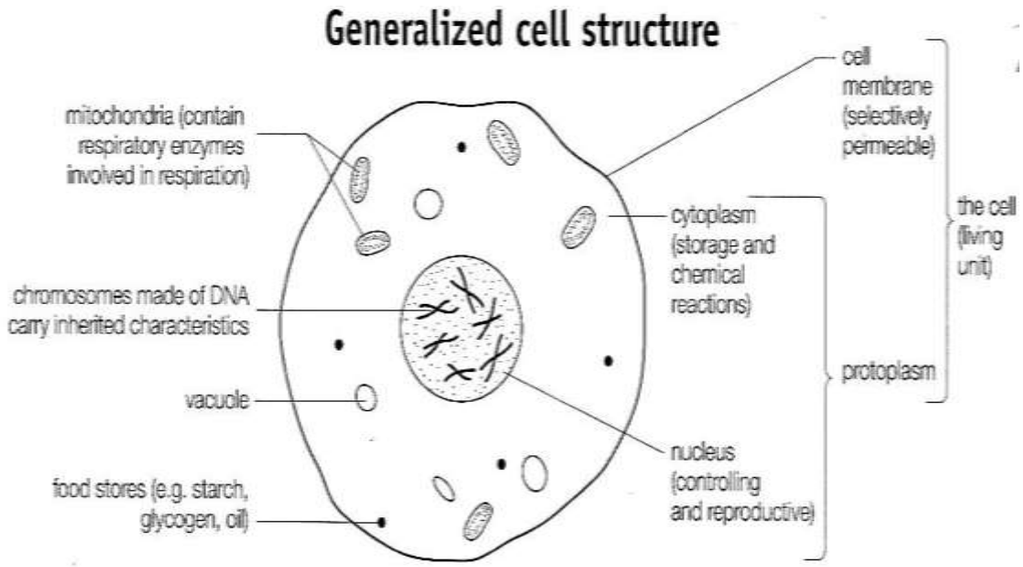
Task A: Write a definition for CELL below (you may research it or come up with your own)

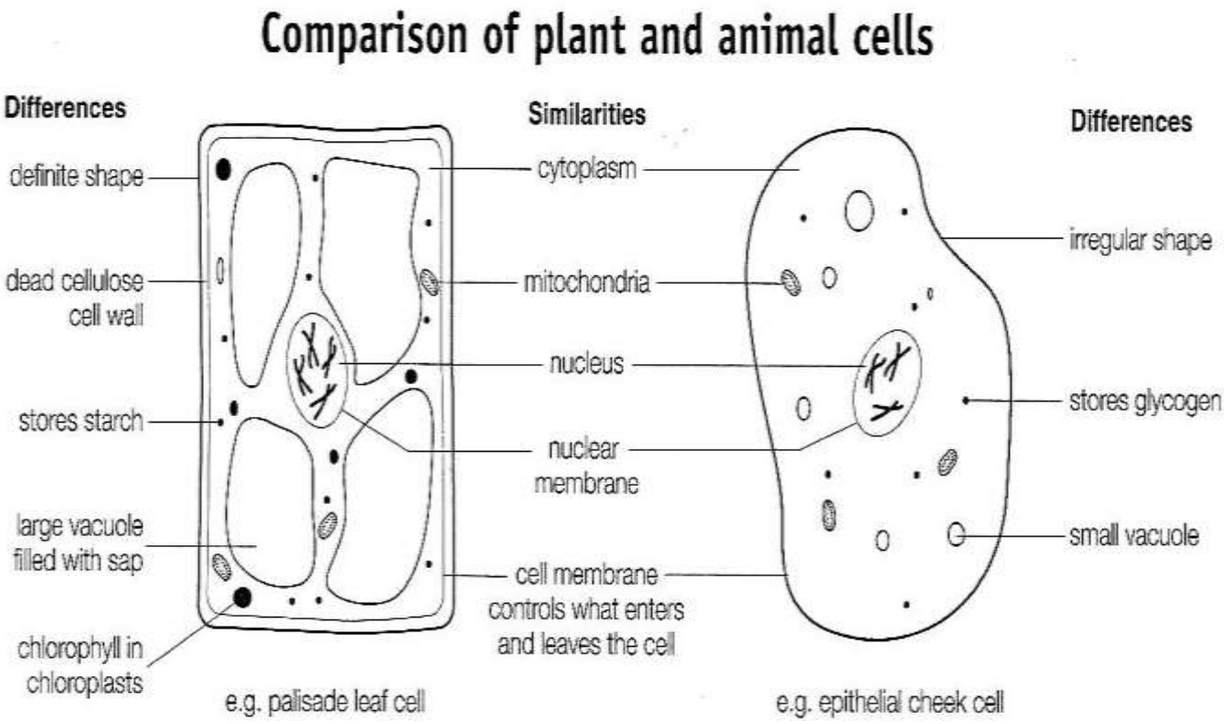
_____
_____
_____
_____
_____
_____



Scientist usually describe cells as the smallest unit of living matter.

- Cells are small compartments that hold all of the biological equipment necessary to keep an organism alive.
- This means that each cell can:
  - it can take in nutrients, convert these nutrients into energy,
  - carry out specialised functions and
  - reproduce as necessary.





Task B: Use reading page 1 to complete the following table which describes the function of each ORGANELLE (cell part) or structure.

TABLE 1 SHOWING THE PARTS OF THE CELL AND THEIR CORRESPONDING FUNCTIONS.

Organelle	Function
Nucleus	
Vacuole	
Mitochondria	
Cell membrane	
Cellulose cell wall (found in plants only)	
Chloroplast (found in plants only	

Mini assessment # 1 - ANSWER ALL QUESTIONS

Each word on the left hand is related to one of the words in right hand column.

Draw a line to match the pairs together.

a) Starch	Inheritance
b) Chloroplast	Selectively Permeable
c) Mitochondrion	Sunlight
d) Chromosomes &DNA	Energy
e) Cellulose fibres	Tough
f) Cell membrane	Storage

TOTAL 6 marks

2) Make a labelled drawing of an unspecialised plant cell in the space below.

Label fully and next to the labels give the function of the part. **TOTAL 10 marks**

3) The plant cell differs from an animal cell in many ways. four ways in which the animal cell differs from the plant cell. **(4 marks)**

a)_____

b)_____

c)_____

d)_____

CELL SPECIALISATION

Task C – See if you can answer the below questions on your own if not READ the pages which follow then answer the questions.

What kind of tissue:

a) Brings about movement in animals? _____

b) Carries oxygen around the body?_____

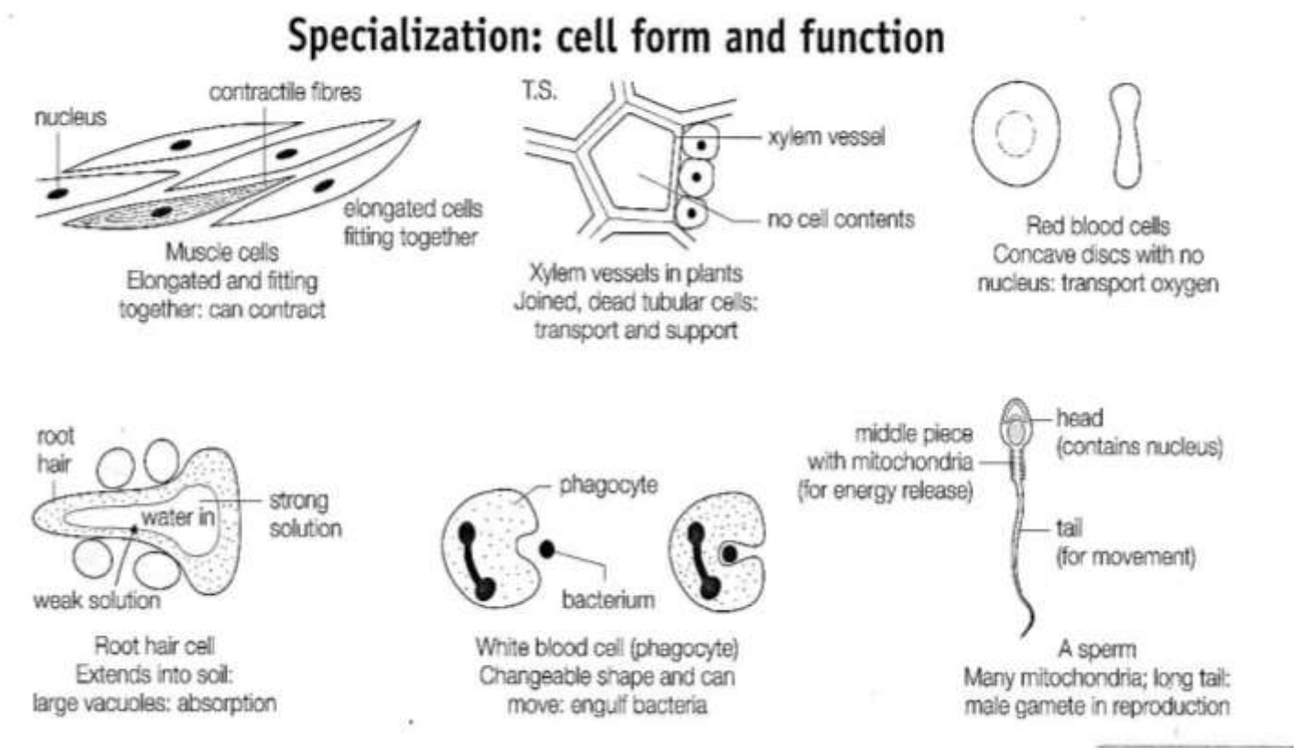
c) Conducts messages from one part of your body to another? _____

What kind of Cell:

d) Destroys harmful bacteria which enters the body?_____

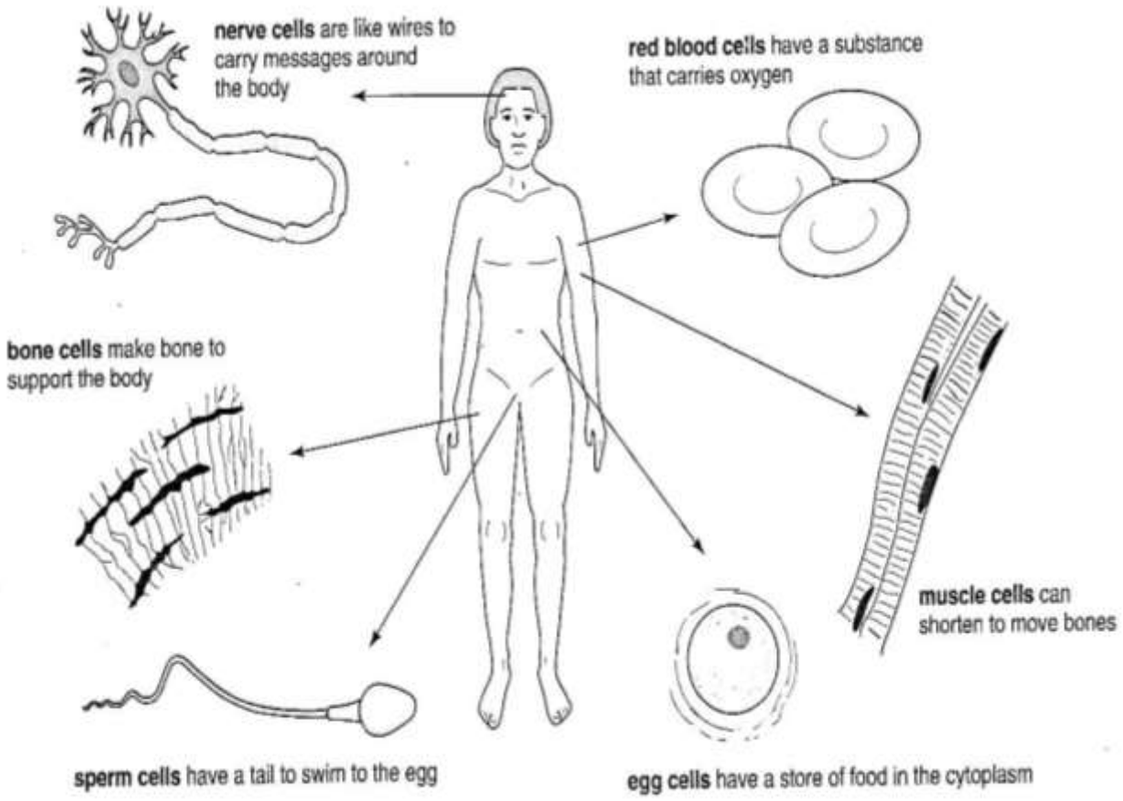
e) Fertilises an egg? _____

TOTAL 5 marks



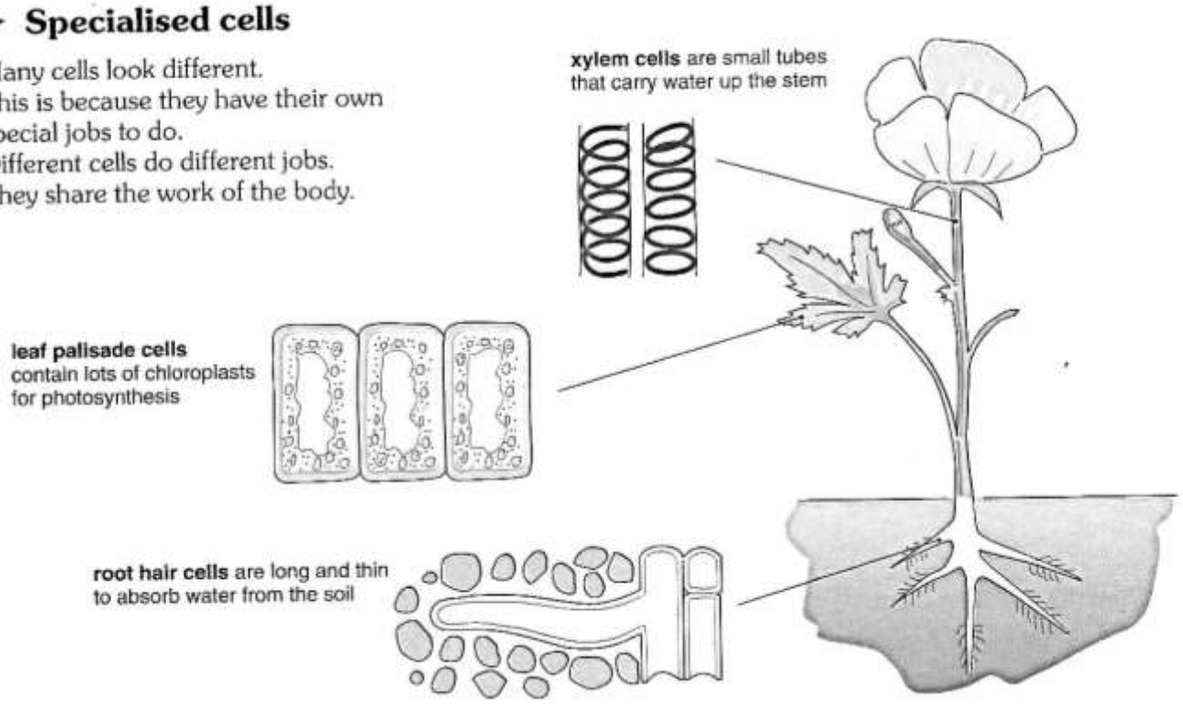
Cell Specialisation is a process in which a cell 's structure is modified (changed) so the cell can carry out a given job.

TASK D: Write down below the name of one Specilaised Cell and the modification it has in order for it to do its job well.



► Specialised cells

Many cells look different.
This is because they have their own special jobs to do.
Different cells do different jobs.
They share the work of the body.

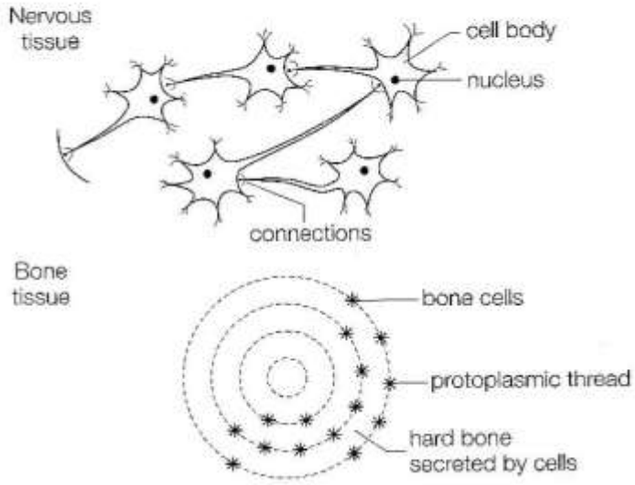


Another IMPORTANT POINT TO REM:

SPECIALISATION OF CELLS (AND THUS TISSUES, ORGANS, SYSYEMS, IS IMPORTANT BECAUSE IT CREATES **A DIVISION OF LABOUR** BETTWEEN THE CELLS WHICH RESULTS IN **IMPROVED EFFICIENCY** IN THE ORGANISM'S BODY.

Cells, tissues and organs

Cell: A unit of protoplasm (made of cytoplasm and nucleus) surrounded by a selective cell membrane.
Tissue: A group of similar cells performing the same function, e.g. muscle, epidermis.
Organ: Tissues working together to perform a certain function, e.g. the stomach, a leaf.
Organ system: Several interrelated organs performing a function, e.g. alimentary canal, transport system.
Organism: A whole individual. Can be one-celled (unicellular), e.g. *Amoeba*, or many-celled (multicellular), e.g. rose, lizard.



► Tissues and organs

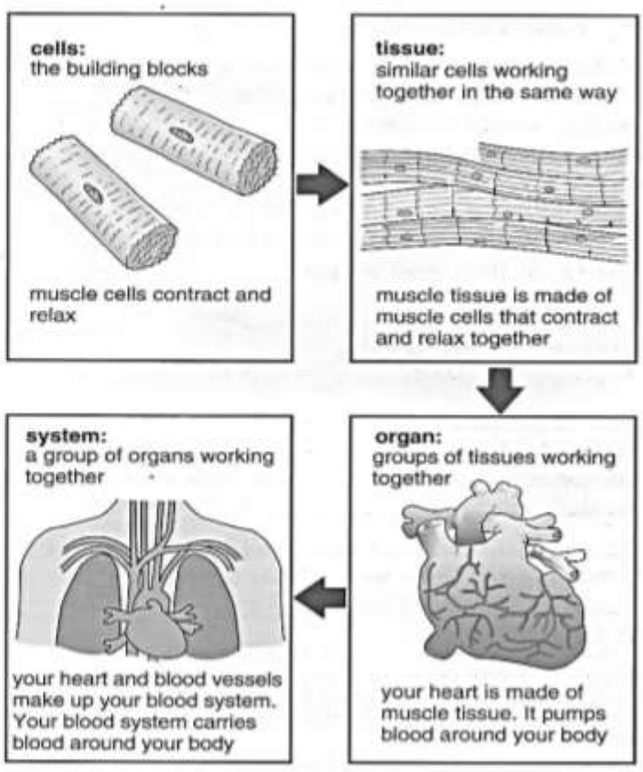
A group of similar cells is called a **tissue**.
All the cells in a tissue look the same and do the same job.
Your muscle tissue is made up of identical muscle cells.

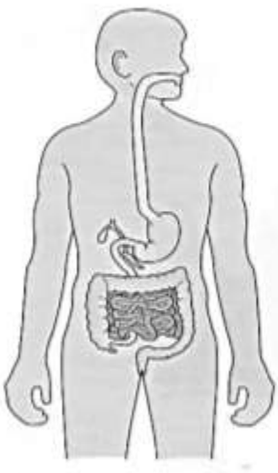
An **organ** is made up of different tissues.
These work together to do a particular job.
Your heart is an organ.
It is made up of different tissues that work together to pump blood around your body.

Your stomach, lungs, brain and kidneys are all organs.
Do you know what each of them does?

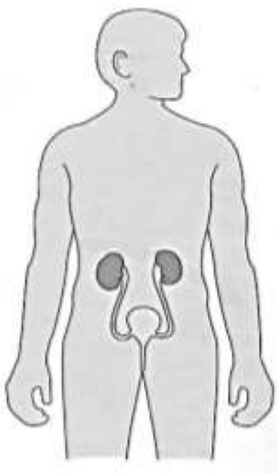
Different organs work together as part of an **organ system**.
Your heart and blood vessels work together as part of your circulatory system.

All of your organ systems make up a living **organism** – that's you!

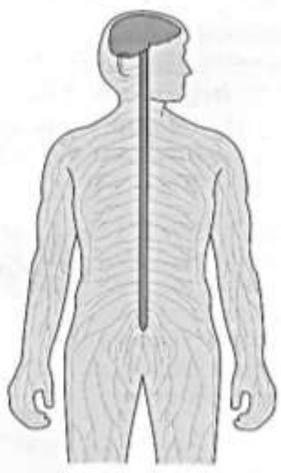




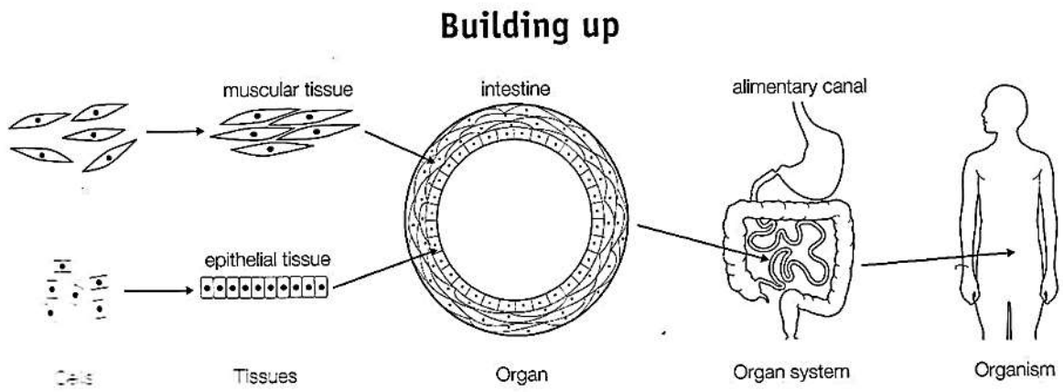
The digestive system is made up of your gullet, stomach and intestines



The excretory system is made up of your kidneys, ureters and bladder



The nervous system is made up of your brain, spinal cord and nerves



Mini Assessment # 2 - Answer all Questions

1) Why is it an advantage to have a division of labour (SEPCIALISATION) between organs in the body?

_____

_____

_____

_____

TOTAL 3 marks

2) Using a specialised cell of your choice, give ONE ways the chosen cell is adapted to

suit its function. Include a drawing.

1)_____

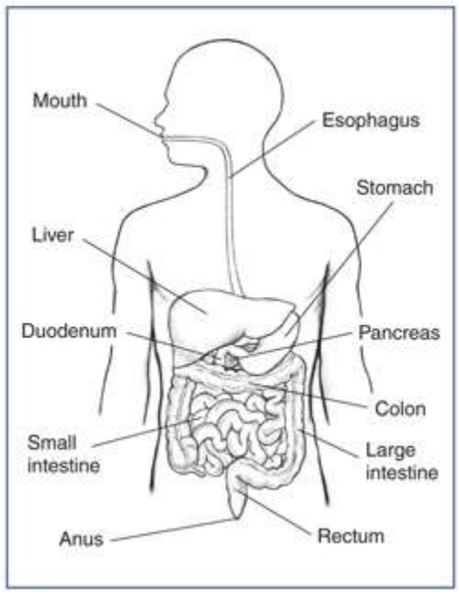
_____

TOTAL 4 marks

Part C: Body Systems:

The body systems are: digestive, excretory, nervous, reproductive, respiration, skeletal and transport.

DIGESTIVE



The digestive system is uniquely constructed to perform the specialized function of turning food into the energy you needed for survival and packaging the residue for waste disposal.

It starts at the mouth with the chewing of food. It continues into the esophagus when you swallow (muscular contractions called peristalsis) delivering food into your stomach. Here the food is held for a period of time mixing with strong enzymes and acids, where it breaks down into a semi-solid, passing into the small intestines (22 foot long tube). Here the nutrients required by the body are extracted by the intestinal walls into the blood stream. It then passes as liquid into the large intestines (colon – a 6-foot long muscular tube that connects the small intestine to the rectum). Here the waste (stool) is converted into a solid and passes out into the rectum. This occurs normally once or twice a day. It usually takes 36 hours for stool to move through the colon. The rectum (Latin for "straight" an 8-inch chamber) connects the colon to the anus which purpose is to receive stool from the colon. **[**When anything (gas or stool) comes into the rectum, sensors send a message to the brain. The brain then decides if the rectal contents can be released or not. If they can, the sphincters relax and the rectum contracts, disposing its contents. If the contents cannot be disposed, the sphincter contracts and the rectum accommodates so that the sensation temporarily goes away.**]** The anus (a 2-inch long canal) is the last part of the digestive tract consisting of several muscles, where when we get an urge to defecate, relaxes to release the contents.

Video Demonstration - https://www.youtube.com/watch?v=JnzwbipJuAA

EXCRETORY

The excretory system is a small system, **which performs the function of excretion – the removal of metabolic waste from an organism's body.**

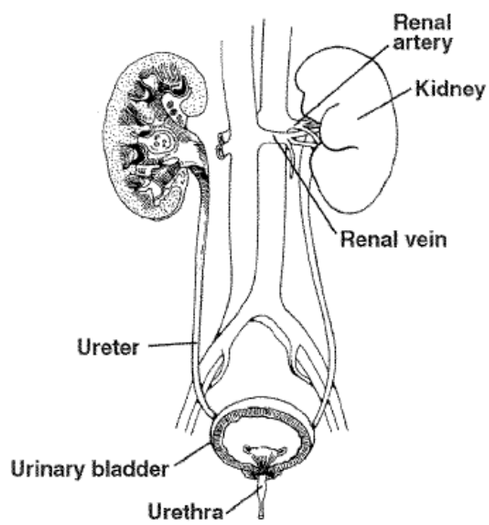


Figure 38–1

The parts of the body involved in this process – skin which houses sweat glands (excretes sweat), the liver, the lungs (which excrete carbon dioxide) and the kidney system. The kidneys which are the core organs are bean-shaped are located on either side of the backbone at about the level of the stomach and liver. Tubes called **ureters** carry waste products from the kidneys to the **urinary bladder** for storage or for release. The main type of waste is a solution called urine which results from the system maintaining a balancing between the

amount of water and salts in the body. It is a combination of watery waste products, salts, organic compounds, and two important nitrogen compounds – uric acid and urea. **Uric acid** and **urea** can be poisonous to the body and must be removed in the urine.

Video Demonstration: https://www.youtube.com/watch?v=TZMJeZL-BVg

NERVOUS SYSTEM

The nervous system consists of the brain, spinal cord, sensory organs, and all of the nerves that connect these organs with the rest of the body. **Together, these organs are responsible for the control of the body and communication among its parts.** The brain and spinal cord form the control center known as the central nervous system (CNS), where information is evaluated and decisions made. The sensory nerves and sense organs of the peripheral nervous system (PNS) monitor conditions inside and outside of the body and send this information to the CNS. Efferent nerves in the PNS carry signals from the control center to the muscles, glands, and organs to regulate their functions.

Video Demonstration**:** https://www.youtube.com/watch?v=sjyI4CmBOA0

REPRODUCTIVE SYSTEM

The reproductive system or genital system is a system of sex organs within an organism which work together for the purpose of sexual reproduction.

Many non-living substances such as fluids, hormones, and pheromones are also important accessories to the reproductive system. The male and female reproductive systems are designed to create new life. Eggs (ova) are made in the female's ovaries, and sperm in the male's testicles. The ovaries and testicles (gonads) also make sex hormones.

The reproductive system has four functions:

- To produce egg and sperm cells
- To transport and sustain these cells
- To nurture the developing offspring
- To produce hormones

The female reproductive organs are the vagina, womb (uterus), fallopian tubes and ovaries:

- Vagina – a muscular canal around 7.5 cm long that extends from the neck of the womb to the genitals, or vulva
- Uterus (womb) – a muscular organ, shaped like an upside down pear. The neck or entrance to the womb is the cervix, which has a small hole in its centre called the ‘Os’.
- Fallopian (uterine) tubes – these tubes extend from the womb, one on each side. They both open near an ovary. These tubes carry the egg (ovum) from the ovary to the womb
- Ovaries – two small almond-shaped glands that contain ova. Sex hormones are also made by the ovaries.

The male reproductive organs are the penis, the testicles, the epididymis, the vas deferens and the prostate gland:

- Penis – contains tissue that fills with blood during sexual arousal, making the penis erect (or 'hard'). Semen is a mixture of sperm and fluid from the male reproductive organs. It exits the penis, through the urethra, during ejaculation
- The testicles (testes) – small oval sex glands located in a skin sack called the scrotum. Sperm and sex hormones are made by the testicles. Keeping the testicles outside of the body means they have a lower temperature, which is important for sperm production
- Epididymis – a series of small tubes attached to the back of each testicle. The epididymis collects and stores sperm

Vas deferens – the epididymis eventually becomes the vas deferens, a larger tube that transports sperm to the urethra (the urinary passage from the bladder

-)
- Accessory sex glands – including the prostate gland, seminal vesicles and the bulbourethral glands. These glands contribute nourishing fluid to the sperm.

RESPIRATORY SYSTEM

The human respiratory system is a series of organs responsible for taking in oxygen in order for the blood to transport it to all parts of the body and expelling carbon dioxide. The primary organs of the respiratory system are lungs, which carry out this exchange of gases as we breathe.

As we breathe, air enters the nose or mouth and passes into the trachea (windpipe) which filters the inhaled air. It branches into the bronchi, which are two tubes that carry air into the lobes each lung. The bronchial tubes are lined with tiny hairs called cilia. Cilia move back and forth, carrying mucus up and out. It collects dust, germs and other matter that has invaded the lungs.

The right lung has three lobes; the left lung has two. The left lung is smaller to allow room for the heart. Lobes are filled with small, spongy sacs called alveoli, the walls of which are composed of a single layer of tissues (epithelial cells) and tiny blood vessels (pulmonary capillaries). This is where the exchange of oxygen and carbon dioxide occurs.

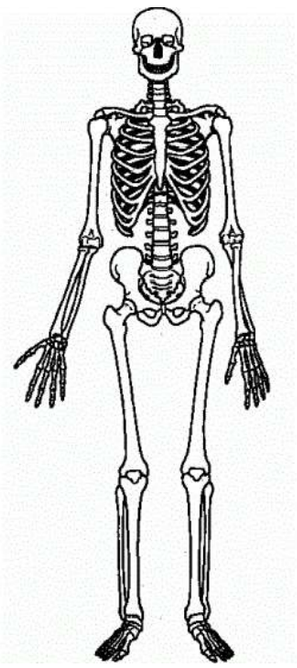
Oxygenated blood goes to the heart through the pulmonary vein, and the heart pumps it throughout the body. The pulmonary artery carries blood containing carbon dioxide to the air sacs, where the gas moves from the blood to the air.

The diaphragm, a dome-shaped muscle at the bottom of the lungs, controls breathing and separates the chest cavity from the abdominal cavity. When a breath it taken, it flattens out and pulls forward, making more space for the lungs. During exhalation, the diaphragm expands and forces air out.

Video Demonstration - https://www.youtube.com/watch?v=kacMYexDgHg

SKELETAL SYSTEM

The skeletal system includes all of the bones and joints in the body and the tissues such as tendons, ligaments and cartilage that connect them. Each bone is a complex living organ that is made up of many cells, protein fibers, and minerals. **The skeleton acts as a scaffold by providing support and protection for the soft tissues that make up the rest of the body as well as to provide attachment points for muscles to allow movements at the joints.** New blood cells are produced by the red bone marrow inside of our bones. Bones act as the body's warehouse for calcium, iron, and energy in the form of fat. Finally, the skeleton grows throughout childhood and provides a framework for the rest of the body to grow along with it. The skeletal system in an adult body is made up of 206 individual bones. These bones are arranged into two major divisions: the *axial skeleton* and the *appendicular skeleton*. The axial skeleton runs along the body's midline axis and is made up of 80 bones in the following regions:



- Skull
- Hyoid
- Auditory ossicles
- Ribs
- Sternum
- Vertebral column

The appendicular skeleton is made up of 126 bones in the following regions:

- Upper limbs
- Lower limbs
- Pelvic girdle
- Pectoral (shoulder) girdle

Your teeth are also considered part of your skeletal system but they are not counted as bones. Your teeth are made of enamel and dentin. Enamel is the strongest substance in your body.

Video Demonstration**:** https://www.youtube.com/watch?v=J8x6tZI2hVI

TRANSPORT SYSTEM

A means by which materials are moved (transported) from the exchange surface to cells located throughout an organism.

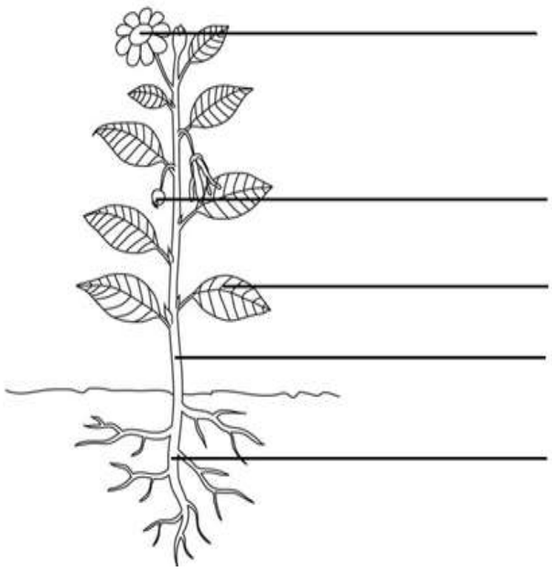
Transport – organisms need to be able to move materials (such as respiratory gases, nutrients, waste products, and heat) both into and out of and within themselves.

Exchange Surface – are biological structures whose features are such that they permit the highly efficient transfer of materials

In humans and other animals the transport system is made up of blood, blood vessels and a muscular pump (heart).

Plant Structure and function

Use the following list of word to label the diagram below: flower, leaf, root, stem/trunk, fruit

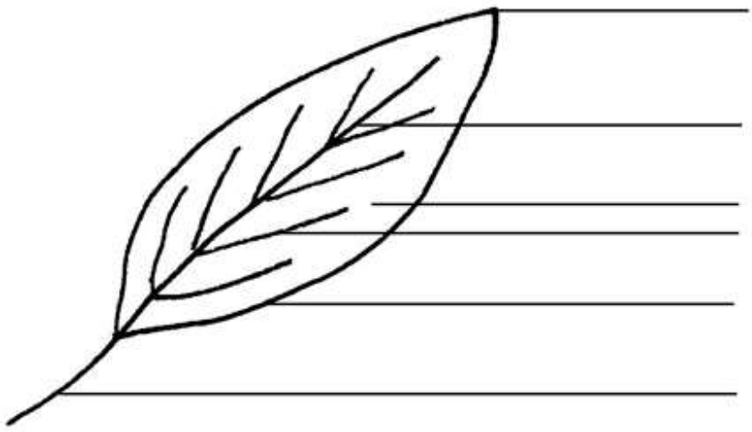


A Diagram of a typical Plant

The table below shows the functions of the different parts of the plant

Structure	Function
Root	anchors the plant and absorbs water and mineral salts, storage organ
stem/trunk	provide a conduit between root and other plant parts for transport of substances; storage organ
leaves	carry out photosynthesis; storage organs
flowers	contain the reproductive organs; develop into fruits; storage organs
Fruits	protect seeds; storage organs
Seed	develop to give new plants; storage organs

Using the following list of words to label the leaf below: midrib, vein, lamina, apex, margin, petiole/stalk



A labeled diagram of a leaf

Definition of photosynthesis: The making of food and oxygen in plant leaves which contain chlorophyll from carbon dioxide and water using the sun energy.

The worded equation for photosynthesis is

$$\text{carbon dioxide + water} \xrightarrow[\text{chlorophyll}]{\text{sunlight}} \text{glucose + oxygen}$$

The chemical equation for photosynthesis is

$$6CO_2 + 6H_2O \longrightarrow C_6H_{12}O_6 + 6O_2$$

The Water needed for photosynthesis is absorbed for the roots of the plant and is transported to the leaves

The carbon dioxide needed for photosynthesis is absorbed through the leaves by a process called diffusion

Photosynthesis is divided into two parts:

1. Light-dependent reactions (light reactions)
2. Light-independent reactions (dark reactions).

In the light stage, the light energy which is absorbed by the chlorophyll is used to split the water molecules (H_2O) into H and oxygen atoms. The H atoms then move on to the dark stage while thee O atoms leave the plant as O_2 gas.

The dark stage does not require light. In the dark stage, the H atoms are combined with the CO_2 molecules to produce glucose($C_6H_{12}O_6$).

The conditions necessary for photosynthesis are:

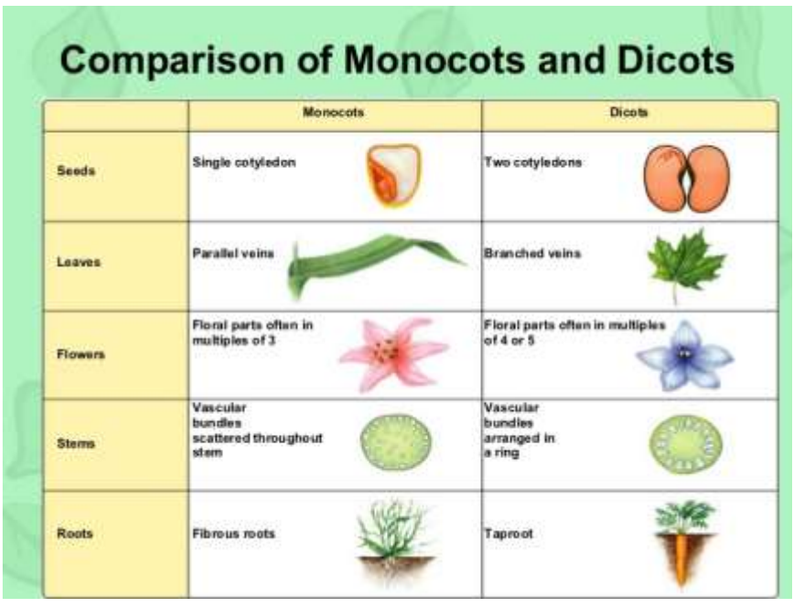
- Light
- Water
- Chlorophyll
- A suitable temperature
- Carbon dioxide

The importance of photosynthesis

1. provides food and oxygen for all organisms to engage in respiration to have adequate amounts of energy and
2. controls the amount of carbon dioxide in the atmosphere thus minimizing the greenhouse effect.

Flowering plants can be divided into two groups:

- Moncotyledons
- Dicotyledons



Crops can be classified as

- **root crops**- A crop where the edible portion is the root e.g

_____

- **leafy crops**- A crop where the edible portion is the leaf e.g

_____

- **fruits**- A crop where the edible portion is the fruit e.g

_____

- **running crops/ vines**- A crop which grows as a vine e.g

_____

- **Beverage**- A crop which is used to made drinks e.g

_____

- **Cereals**- A crop where the edible portion is the grain e.g

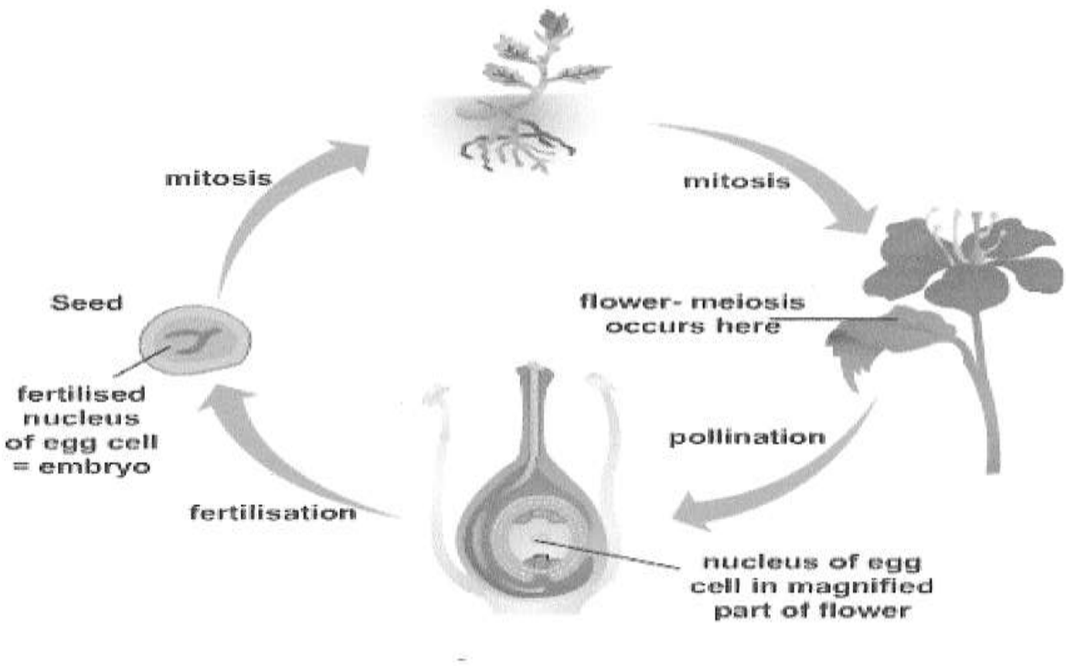
_____

- **fruit-vegetables**- A vegetable with a pulpy, seed-rich body which grows on a vine. Examples Eggplants, peppers, squashes, tomatoes,

Homework: Give 3 examples of the EACH crop stated above.

root crops			
leafy crops			
Fruits			
running crops/ vines			
Beverage			
Cereals			

Life Cycle of a flowering plant



Site of Reproduction

- **The Flower:**

The flower is the reproductive unit of some plants (angiosperms). Within a flower, there are structures that produce both male gametes and female gametes.

- Male structures collectively called:

Stamen: filament, anther,

- Male Gamete: POLLEN GRAIN

- Female structure:

Carpel: Stigma, Style, Ovary,

- Female Gamete: OVULE containing the OVUM

Mini Assessment #1 - Complete the word fill exercise below:

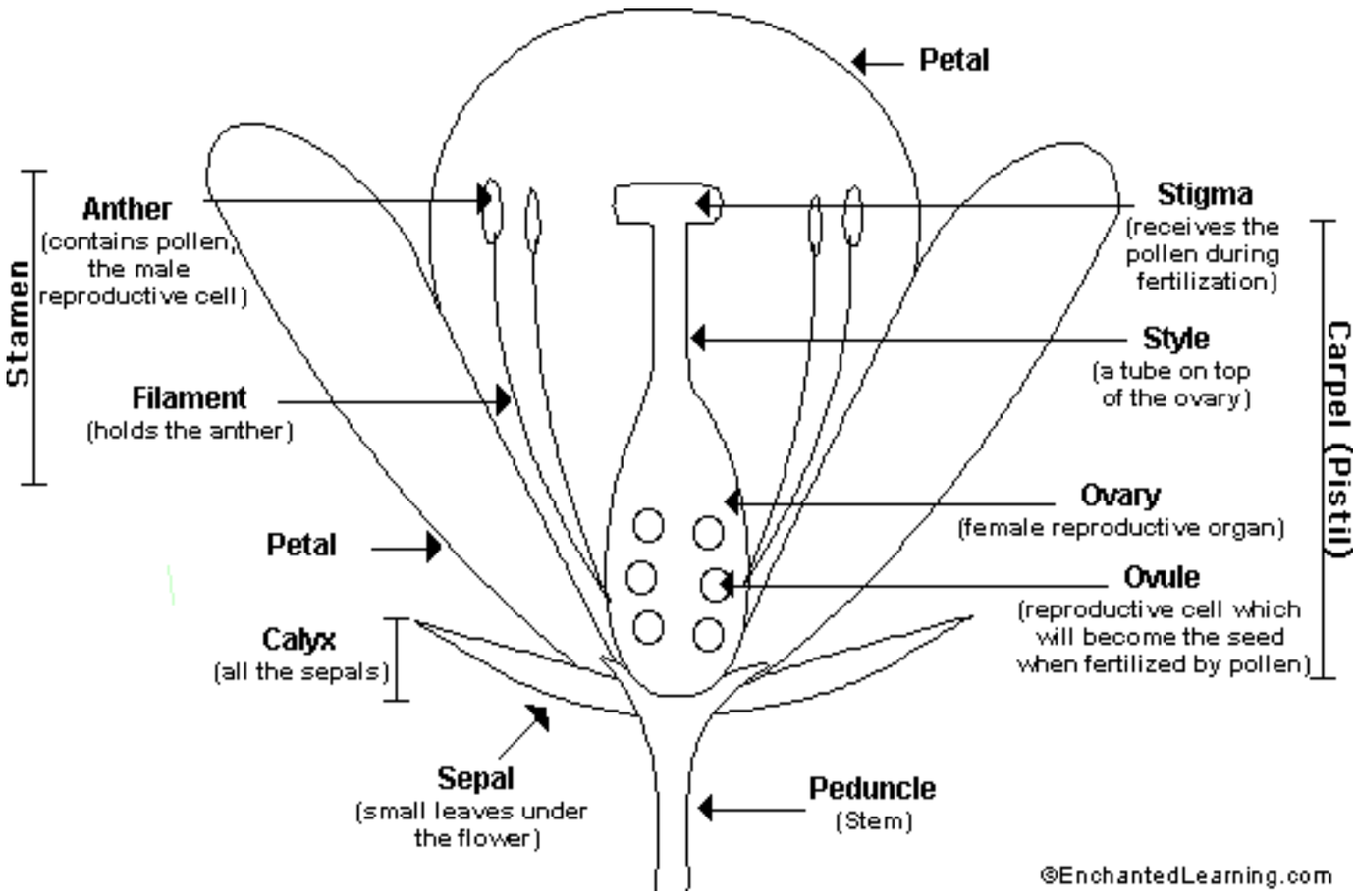
The male part of the flower is called the _____consists of the _____ and _____. The female part of the flower is called the _____ consists of the _____, _____ and _____. The male gamete is made in the _____ and is found inside the _____ grain. The female gamete is found in the _____ and is called an _____.

FLOWER STRUCTURE

Activity 1 - Obtain one of the following Barbadian flowers – Pride of Barbados or Hibiscus and use your specimen to identify the structures of your flower which are shown in the diagram of the labeled flower.

Pride of Barbados	Hibiscus

Flower structure – learn to draw and label



Pollination

Pollination is the transfer of the male sex cell – pollen grain from the anther to the stigma (surface is sticky) of the female of the flower of the same species.

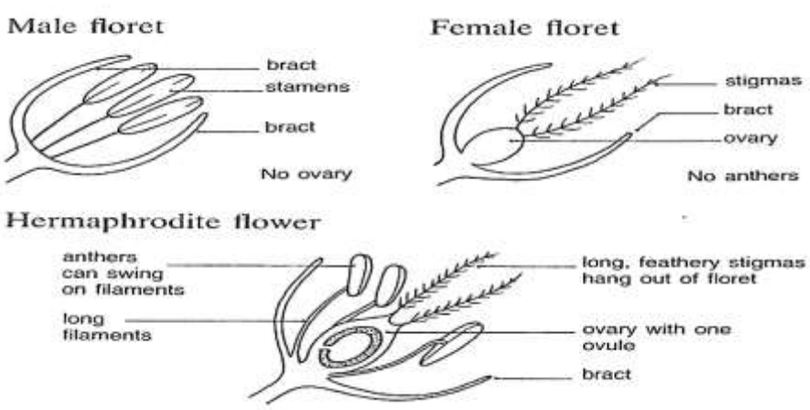
Pollination is of two types:

- Animal Pollination
- Wind Pollination

Insect pollination	Wind pollination
e.g. *Crotalaria*, *Cassia*	e.g. grass, maize
1 Large, coloured petals to attract insects. Flower structure may be adapted for one particular kind of insect, allowing them to land and feed.	1 Petals often absent. Parts protected during development by small green or brown bracts which do not get in the way of the transfer of pollen.
2 Usually scented to attract insects.	2 Not scented as the flowers do not attract insects.
3 Usually produce nectar on which the insects feed, and while doing so transfer the pollen. May have guidelines directing insects towards the nectar.	3 No nectar produced as no need to attract insects to the flower.
4 Stamens inside the flower where insects are more likely to pick up pollen.	4 Filaments grow long so stamens hang out of the flower. Stamens shake in the wind to disperse pollen.
5 Pollen often sticky, and with small spines to adhere to bodies of insects. Fairly large and heavy.	5 Dry, smooth pollen so it does not stick together. Small and light so it blows easily in the wind. Very large quantities produced as much will be lost.
6 Stigma sticky to hold onto pollen and held inside the flower where insects will come into contact with it and deposit pollen.	6 Feathery stigmas with large sticky surface. Hang out of the flower so they are more likely to catch pollen from the air.

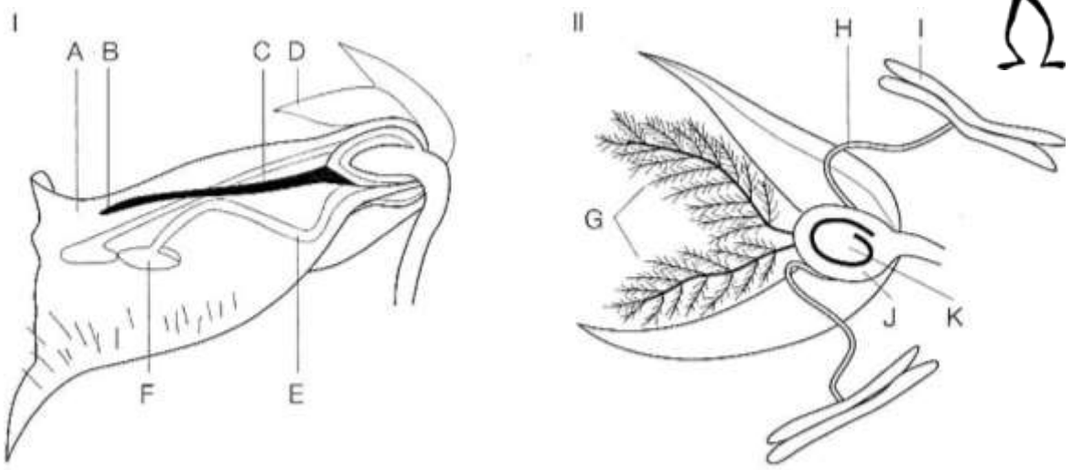
Example of A wind Pollinated flower eg grass plant

- These are called FLORETS
- There are no sepals or petals and the part are enclosed in a small bracts.



Mini Assessment # 2

1) (i) Label the parts of the flower in the diagrams I and II below. (5 marks)



A_____ B _____

C_____ D_____

E_____ F_____

G_____ H_____

I_____ J_____

K_____

(ii) Which Flower I OR II is animal pollinated? Give two reasons for your answer (3 marks)

_____

_____

_____

(iii) Which Flower I or II is wind pollinated? Give two reasons for your answer (3 marks)

_____

_____

_____

_____

Pollen tube Formation and Fertilisation

1. The pollen tube grows through the stigma and style toward the ovules in the ovary.
2. The germ cell in the pollen grain divides and releases two male gametes which move down the pollen tube.

3. Once the tip of the tube reaches the micropyle end of the ovules sac, the tube grows through into the embryo sac. A male gamete fuses with the egg, producing the zygote (which will later develop into the embryo). **This is fertilisation.**

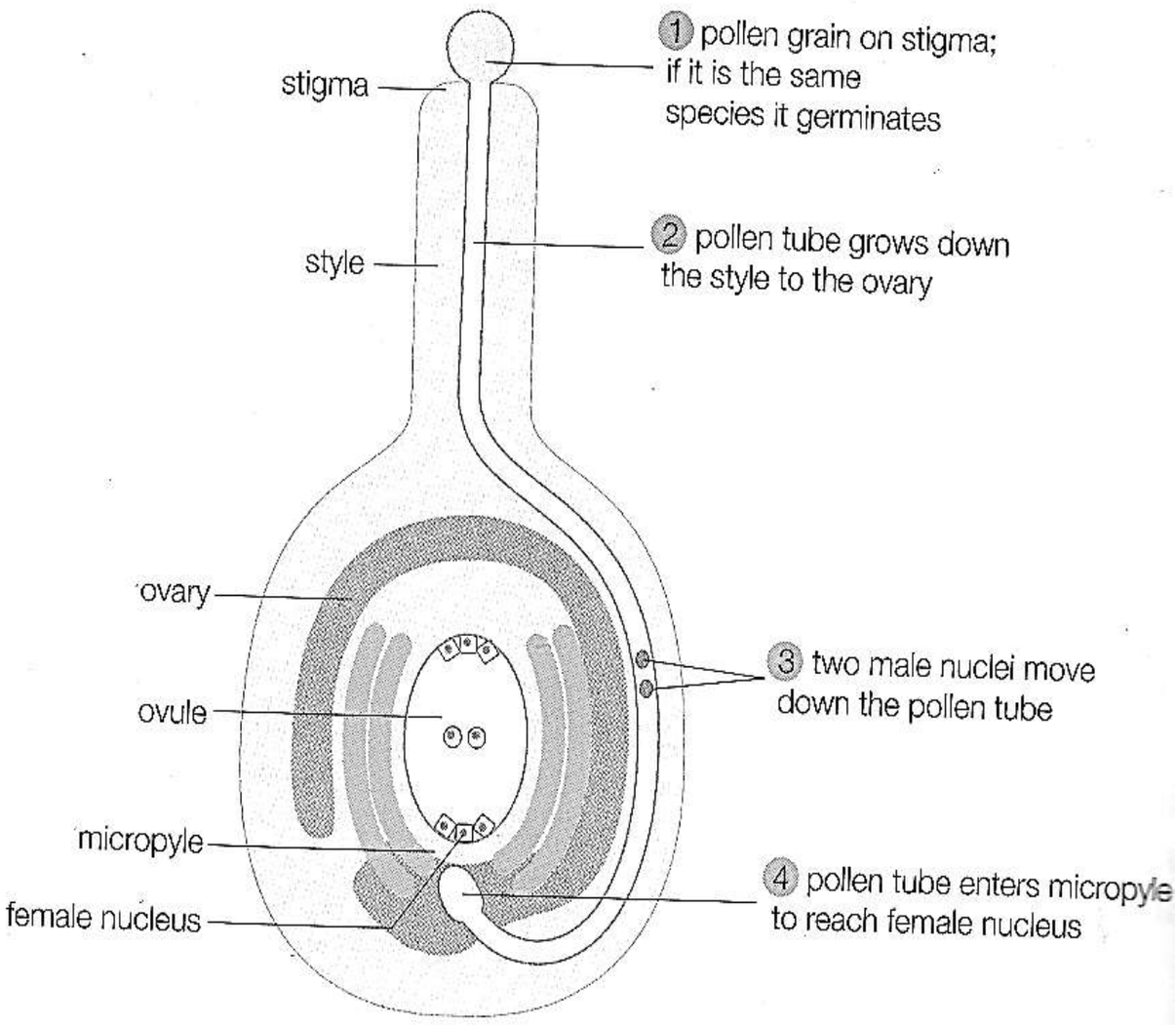


Diagram showing pollination to fertilization in Flowers

Assessment #3 - Thinking time: (5 marks)

Write a mini composition in which you discuss the importance of pollination to Agriculture.

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

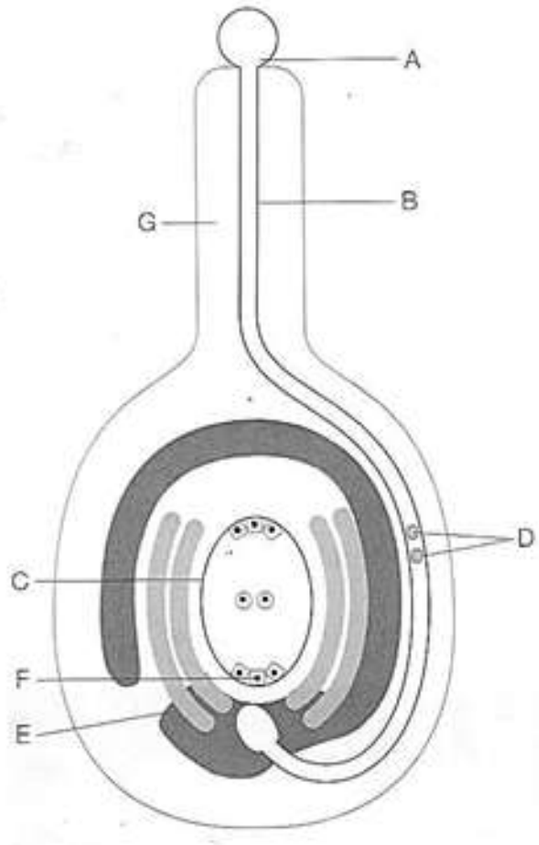
Development of the fruit and the seeds

1. The zygote divides many times by mitosis to produce an embryo. It differentiates to become a *plumule* (young shoot), *radicle* (young root) and either *1 or 2 cotyledons* (seed leaves).
2. Endosperm tissue is produced, this feeds the developing embryo, it may gradually disappear as the cotyledons develop.
3. To accommodate all this growth the embryo sac expands.
4. The tissue surrounding the embryo sac becomes the tough and protective ***testa*** (seed coat). The micropyle remains though so that oxygen and water can be taken in at germination.
5. The water content of the seed decreases drastically so the seed is prepared for dormancy.
6. The ovary wall becomes the ***pericarp*** - the fruit wall, the whole ovary now being the ***fruit***.

Remember the ovule develops into the seed.

Mini Assessment # 4

1) i) Label A – F on the diagram below (3 marks)



ii) Describe what happens in the flower after pollination occurs. Be sure to include what happens to F and C. (4 marks)

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

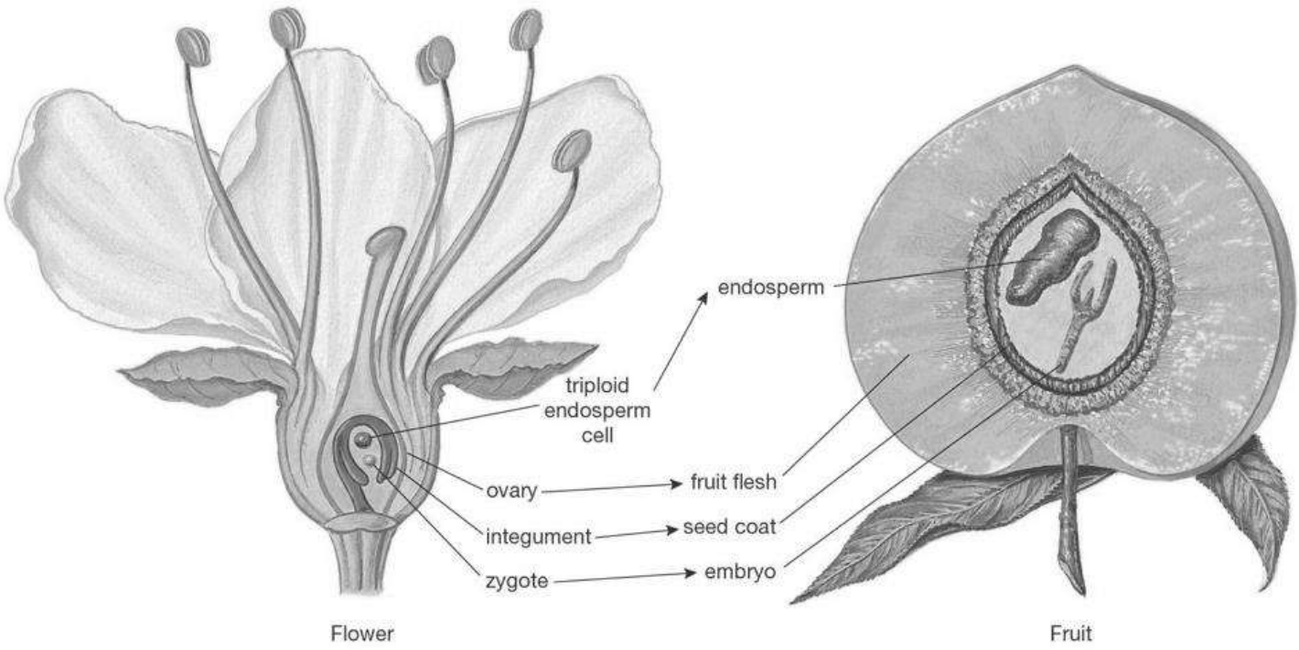
_____

Fruits and Seeds

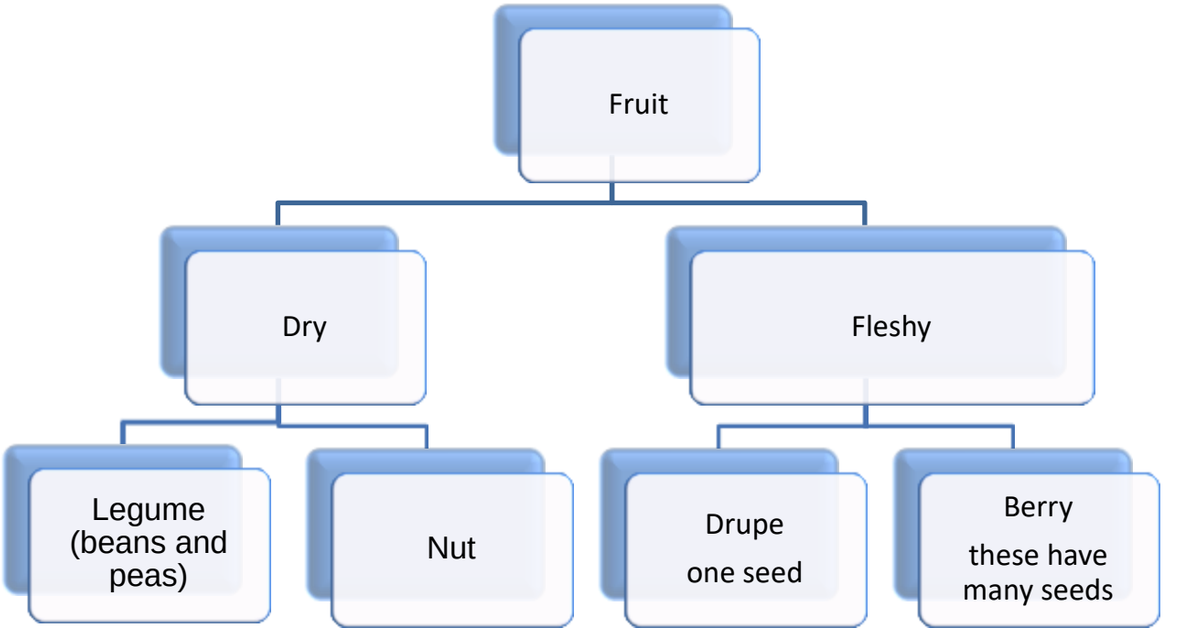
The function of the fruit is to protect the seeds and to aid in their dispersal, e.g. by an animal.

- The shape of the ovary and the ovules inside determines the structure and the fruit and the seed.
- The ovary of the flower contains the ovules.
- As fertilized ovules develop into seeds, the ovary wall develops into the fruit.
- **In science, the term "fruit" refers to a mature ovary that contains seeds**.

Fruit anatomy



Types of Fruits



Mini Assessment# 5

Fruit type	My example	Your two examples each
• **Legume**	String beans	
• **Nut**	Hazelnut	
• **Drupe**	Peach	
• **Berry**	Tomato	

Mini assessment # 6:

What is meant by the terms TRUE FRUIT and FALSE FRIUT? (2 mark)

_____

_____

_____

_____

_____

Give Four examples of each (2 marks)

_____

_____

Fruit dispersal

Answer the following on your own:

i) Why do seeds need to be dispersed away from the parent plant? (2 marks)

_____

_____

_____

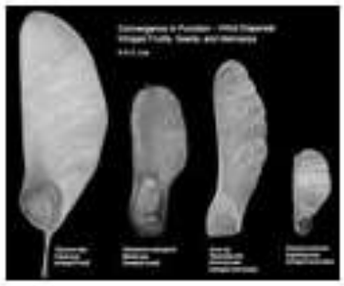
_____

- The form of the fruit gives clues about its dispersal.
- Small, dry fruits with “wings” or “parachutes” may be wind-dispersed. Fleshy fruits are often animal dispersed. Explosive fruits can fling seeds away. Floating fruits may be water dispersed.

How are these fruits dispersed?

Dandelion

Coconut



Mahogany

Cocklebur

Mango

Cherry

pg 2.

Fruits

Fruit: structure from the developed ovary only. Contains seeds. Can be dry, e.g. pods, or fleshy, e.g. pawpaw, mango.

False fruit: formed from the ovary and other flower parts, e.g. apple, pineapple.

Importance of dispersal

Dispersal allows fruits and seeds to be transported away from the parent plant, so:

1 when seeds germinate and seedlings grow, there is less competition with the parent plant and each other for water, minerals and light;

2 seedlings are less likely to become weak and diseased;

3 more chance to get into new environments where their genetic variation may help them extend the range of the plant species.

Fruit and seed dispersal

• Mechanical dispersal

e.g. *Caesalpinia pulcherima*

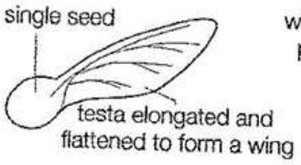
Leguminous plants (legumes) produce dry fruits called pods.

The fruit wall (pericarp) dries out and tension is produced. When this is suddenly released the seeds are shot out and dispersed.

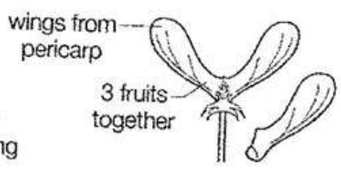
• Wind dispersal

Wings increase surface area: volume ratio, so seed/fruit is lighter and easily blown by the wind and dispersed.

Winged seed, e.g. Cedar

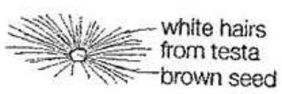


Winged fruit, e.g. Crow



Hairs make a parachute making the light seeds blown about by the wind.

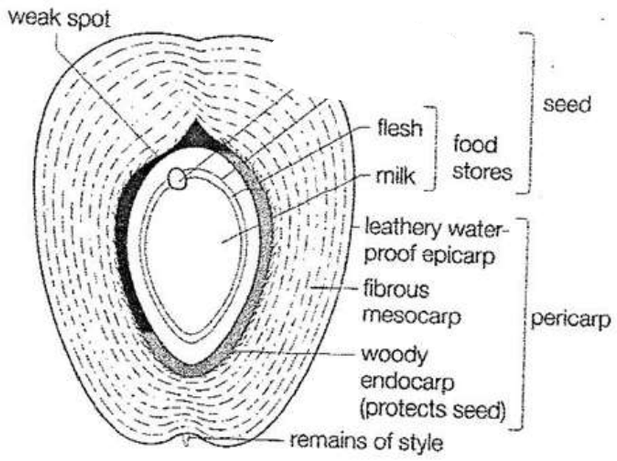
Hairy seed, e.g. Sea Island cotton



Hairy fruit, e.g. *Tridax*

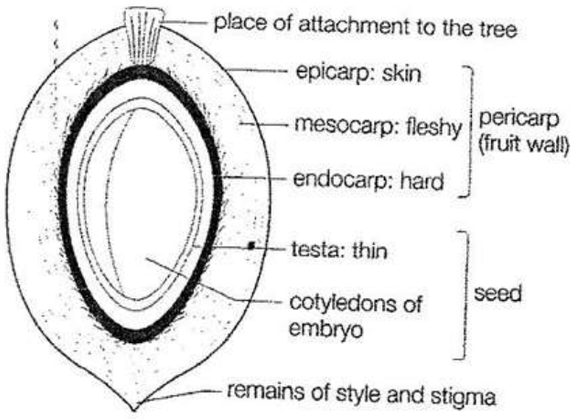
• Water dispersal

e.g. Coconut. The coconut is light (air spaces in the mesocarp) which reduces its density so it can float in sea water. It is also waterproof (leathery epicarp) which protects the embryo during dispersal. When washed ashore the pericarp rots and the embryo grows out.



• Animal dispersal

Fleshy fruits, e.g. mango, dunks. One-seeded, with soft testa and enclosed in hard endocarp. Bright skin (epicarp) is attractive to animals which eat fleshy mesocarp and throw away the seed which later germinates.



Fleshy fruits, e.g. pawpaw, tomato, cucumber. Many-seeded, with hard testas. Bright attractive epicarp and flesh (meso and endocarp) eaten by animals. They either eat the seeds which pass out unharmed, or throw them away. The seeds later germinate.

Adhesive fruits, e.g. sticky drops (hog-weed) or hooks (sweethearts). These attach to animals, clothing or skin and are dispersed.

Min Assessment Questions #7

1. Why do seeds need to be dispersed away from the parent plant? (2 marks)

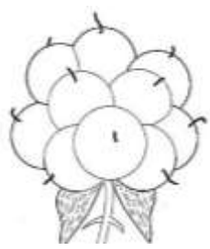
_____

_____

_____

2. Examine the diagrams below of two fruits and describe fully how dispersal occurs in each. (4 marks)

Fruit A



Fruit B

_____

_____

_____

_____

_____

3. For each of the seeds shown state its mechanism for seed dispersal and describe the adaptations that are suited to the mechanism (4 marks)

Name of plant	Diagram of seed	Seed dispersal mechanism	Adaptations
Pea			
Coconut			

SBA assessment (RC): Task: Create a comic strip/ handout which depicts the events occurring from Pollination to dispersal in flowering plants.

Seed structure and their functions

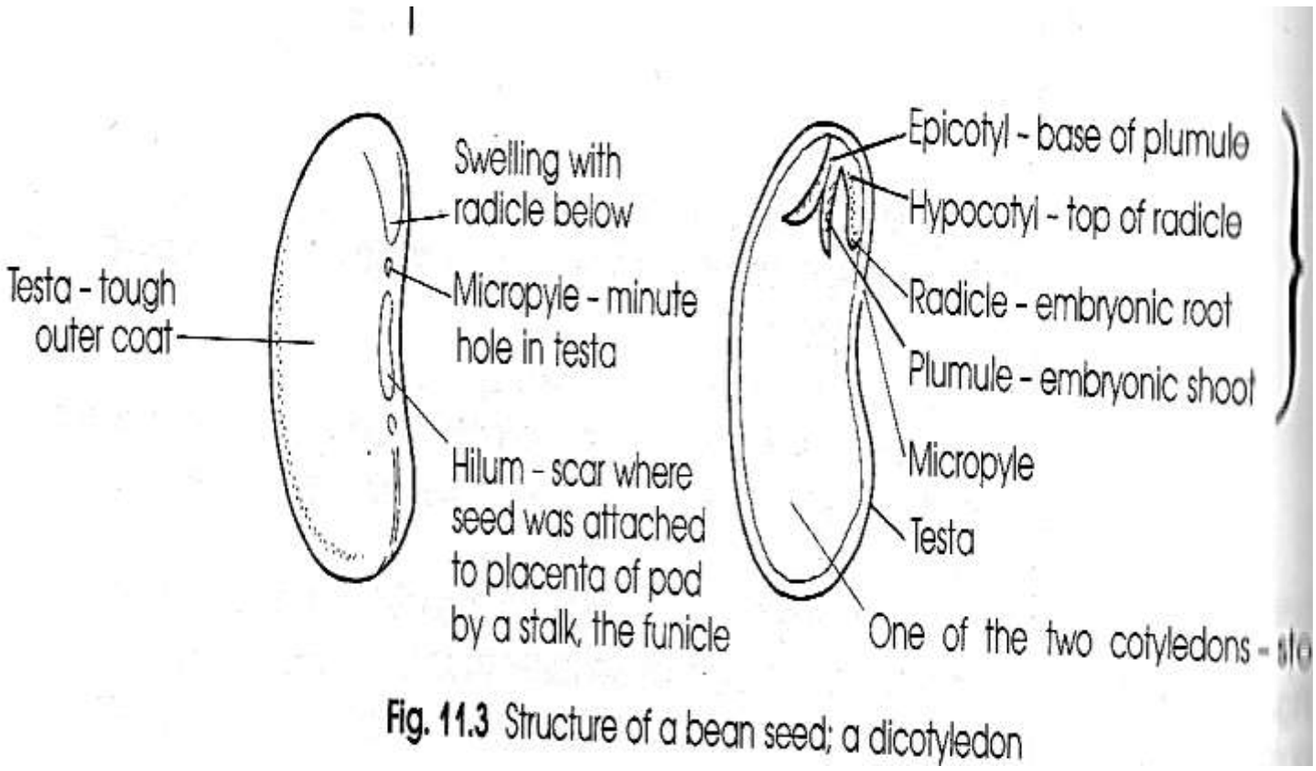
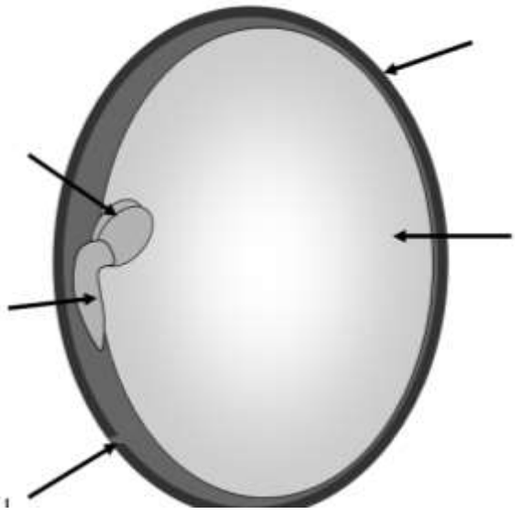


Fig. 11.3 Structure of a bean seed; a dicotyledon

Structure	Function
Plumule	Young shoot grows into the stem, branches and leaves
Radicle	Young root, is positioned to burst through the seed coat at the start of germination
Testa	A hard seed coat which protects the embryo and cotyledons
Micropyle	Small hole where water enters the seed
Cotyledon	Provide food as the embryo grows
Hilum	Scar where the seed was attached to the pod

Mini Assessment #8

Label the diagram: (2 marks)



What are the jobs of the: (5 marks)

a) Cotyledons:

_____

b) Plumule:

_____

c) Radicle:

_____

d) Testa:

_____

e) Micropyle:

_____

- Seeds can remain dormant in the soil for long periods of time. Dormancy helps ensure that seeds only germinate when conditions are right.
- When we weed or cultivate a bare patch of soil, the weeds that sprout up immediately usually come from the “seed bank” already in the soil.
- Seeds require moisture and the right temperature to germinate.
- In addition, some seeds germinate only after certain environmental signals:
    - Drying
    - Temperature (period of cold or heat)
    - Disruption of the seed coat

Germination

- Germination is the growth of the embryo out of the testa so that it becomes anchored in the soil as an independent or young plant.

i.e. it is the growth of a seed into a seedling.

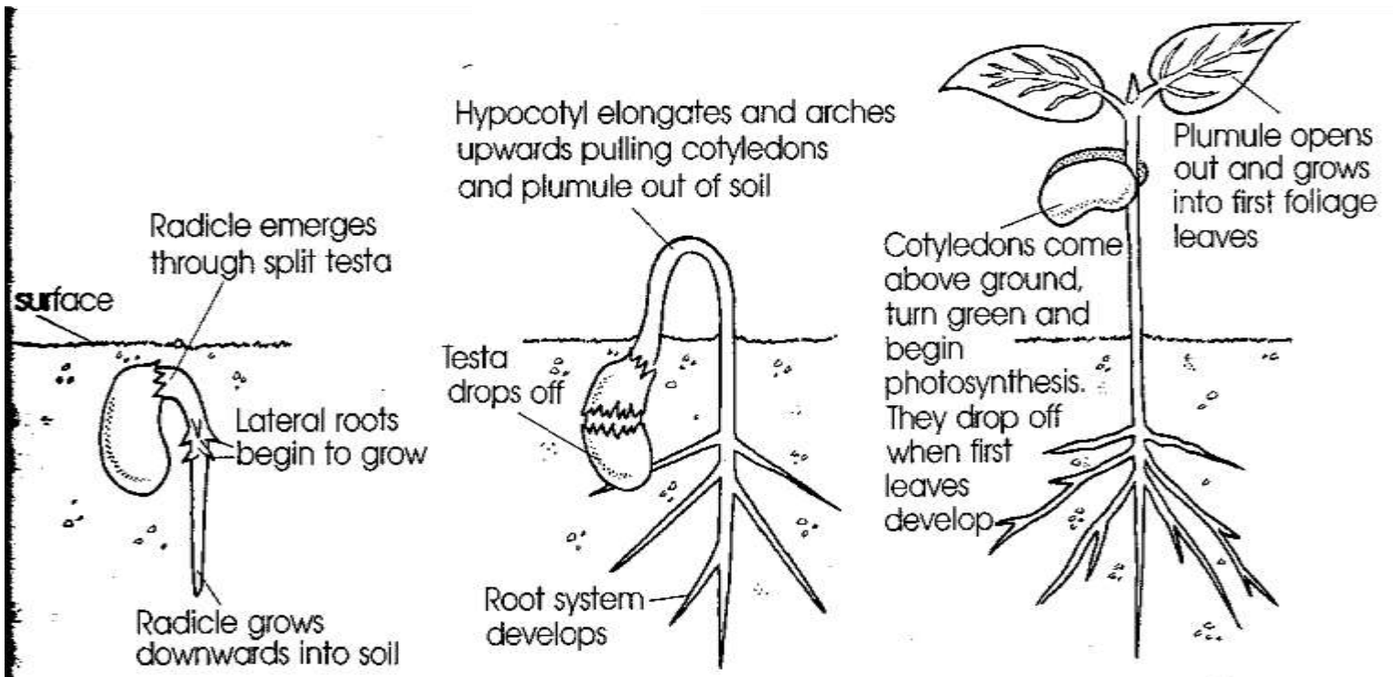


Fig. 11.5 Stages in the germination of a red bean; an example of epigeal germination

Conditions necessary for Germination

A seed will only germinate when conditions are favorable for growth. These are:

1. **Water – absorbed from the soil**

It is used:

a) build new tissues

b) Carry food from the cotyledons to the areas of growth

c) In photosynthesis when the leaves appear

2. **Oxygen**

Taken from the air spaces in the soil, is used for respiration to provide energy for growth.

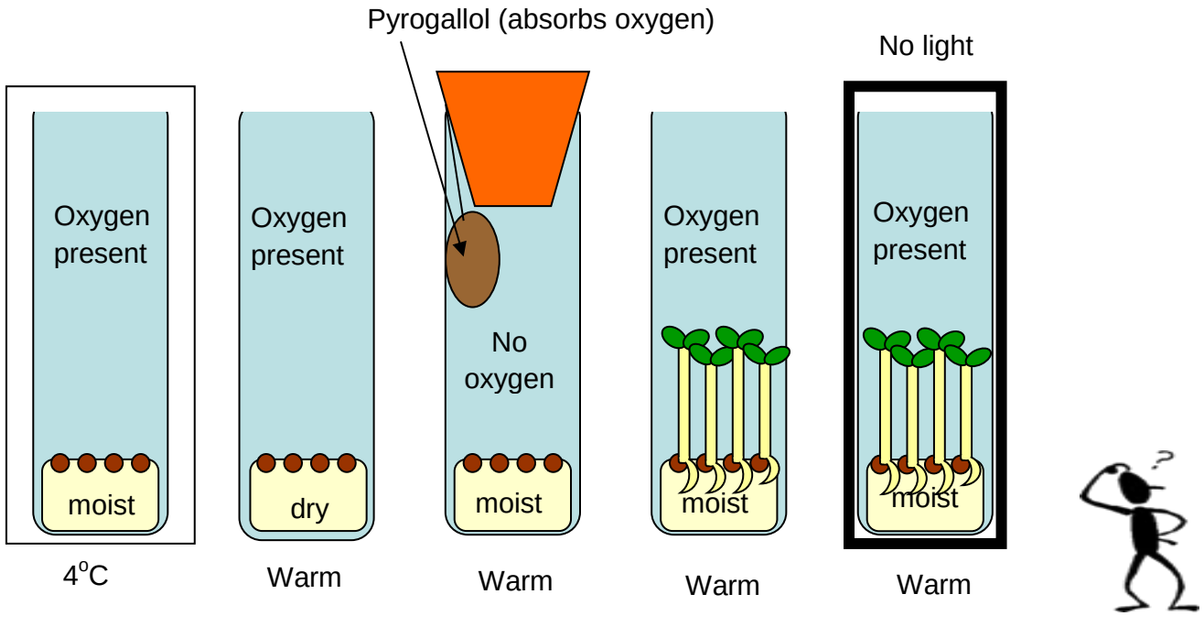
3. **Temperature (Warm temperatures)**

The correct temperature (6-40 degrees C) speeds up the chemical reactions occurring in the seed.

Some seeds require light e.g. lettuce seeds others do not.

Mini Assessment #9

a) Summarise the experiment results below to explain what conditions are required for seed germination: (5 marks)



_____

_____

_____

_____

_____

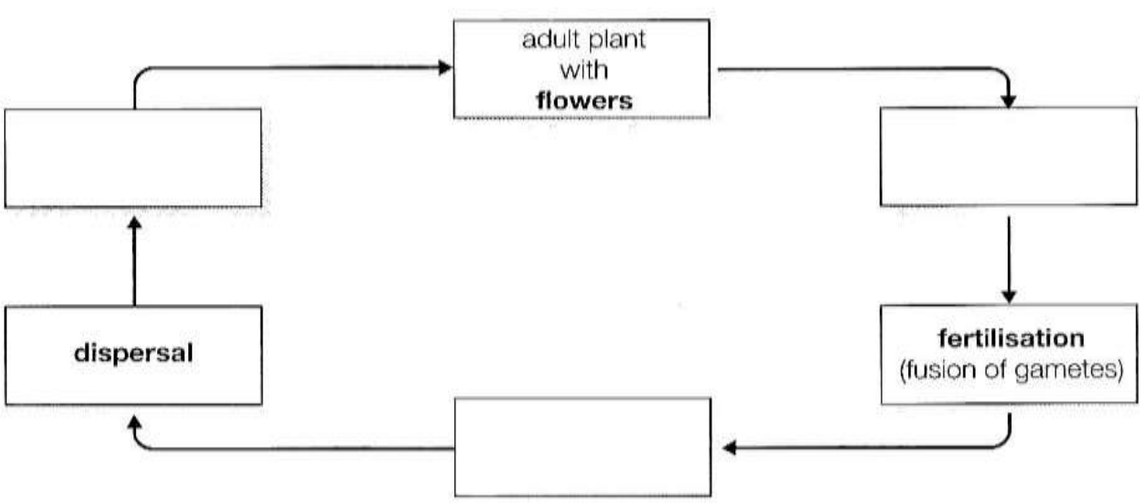
_____

b) Why is germination important to farmers/humans? (2 marks)

_____

_____

c) Complete the chart to show the life cycle of a plant (3 marks)



SBA – Planning and Design Activity: Design an experiment to test whether the following is true: large seeds germinate faster than small ones.

NAME:_____ DATE:_____

FOOD CHAINS AND FOOD WEBS

Use the words below to fill in the blanks. Each word can be used once, more than once or not at all.

carnivores	food chain	omnivores
chemical	food web	producers
consumers	herbivores	sunlight

A/an _____ is a flow chart which displays the feeding relationships existing between living organisms. Some organisms are shown below. Create a food chain using these organisms.

At the beginning of a food chain, there are organisms such as plants that make or produce their own food from inorganic substances. These organisms are called _____. They harness _____ energy and convert it into _____ energy.

Organisms in a food chain which feed on other organisms to meet their energy needs are called _____.

All animals are _____ and different animals have specific roles in a food chain. Animals which feed on plant materials only are called _____; animals which feed on animal materials only are called _____; and animals which feed on both plant and animal materials are called _____.

In the food chain you created earlier, identify:

- one producer
- one herbivore
- one consumer
- one carnivore

A _____ is an extensive network of interlocking food chains.

Work with your teacher to create a food web using the following information.

ORGANISM(S)	WHAT THE ORGANISM EATS
grasshopper, snail	grass
beetle, caterpillar	mango tree
kiskedee (bird)	beetle, caterpillar, grasshopper
rat	grasshopper, snail
snake	rat
hawk	snake, kiskedee

Space to create your food web:

In the space below, create 2 food chains from this food web.

First food chain:

Second food chain:

Use the table below to create a food web.

ORGANISM(S)	WHAT THE ORGANISM EATS
tadpole, snail	water weed
mosquito larva, zooplankton	phytoplankton
fish	mosquito larva, zooplankton
water bird	fish, tadpole

Space to create your food web:

Air: There are five major components of air:

Name of Gas	Formula	Percentage (%)
nitrogen	NO_2	78
oxygen	O_2	21
water vapor	H_2O	1
argon	Ar	0.9
carbon dioxide	CO_2	0.04

Uses of the gases – oxygen, nitrogen and carbon dioxide

Oxygen

- Used in internal respiration in animals (a form of slow combustion). This is where animals use oxygen and sugar at the cellular level to generate energy which in the process results in waste products such as carbon dioxide and water are produced.
- Used for breathing **e.g.** in hospitals to help people with respiratory conditions, mountain climbers and deep sea divers
- Supports combustion (burning of fuels) e.g. igniting gas stoves used for cooking
- Needed to facilitate reactions between substances e.g. high temperature welding and in steel production
- Production of ozone which is made up of 3 oxygen atoms; when electrical sparks (lightening) pass through air. Ozone is found in the upper atmosphere where it absorbs most of the sun's harmful ultraviolet radiation.

Nitrogen

It is essential to all organisms as it is found in molecules in living cells e.g. proteins. It is therefore carried through a cycle called the Nitrogen Cycle where it circulates through the air to animals, to plants and to the soil and then back into the air again.

- Used in the manufacture of ammonia which is then used in the production of fertilizers and explosives.
- Under extreme pressure you can produce liquid nitrogen (exists below – 196 °C) which has many uses including freezing food.
- Used in food preservation in helping to keep packaged goods fresh e.g. packages of chips, nuts etc
- Used to store sperm in hospitals and to help in fertility treatment

Carbon Dioxide

This is poisonous to humans but needed in plant growth.

- Plants use carbon dioxide in photosynthesis to produce oxygen and glucose.

  CO_2 (g) + H_2O (g) → sugar (glucose) + O_2 (g)

- It is produced in alcoholic fermentation where glucose in the presence of an enzyme produces alcohol and carbon dioxide. This process is the same that occurs in rotting fruit.
  Glucose (from fruit or barley) → ethanol + CO_2 (g)
- Used as refrigerant and dry ice to create the 'misty' effect on stages since when cooled to -45° C it solidifies.
- Used as the active agent in fire extinguishers (where it exist as a liquid under high pressure) since it does not support combustion.

Noble Gases

Also known also as '**Inert**' gases which refer to their unreactive nature.

Name	Symbol	Properties
Helium	He	All these gases are colourless, odorless and tasteless along with the exception of Radon are very unreactive. Radon is radioactive.
Neon	Ne	
Argon	Ar	
Krypton	Kr	
Xenon	Xe	
Radon	Rn	

Uses of Noble Gases

Helium

- Being eight times lighter than air and not flammable, it is commonly used to fill airships, blimps and balloons and therefore relatively safe to use for these purposes.

- Used by deep-sea divers to avoid *'the bends which is an extremely painful condition of the formation of bubbles in the blood'*. Mixtures of helium and oxygen are used as an artificial 'air' for divers and others working under pressure instead of the nitrogen in normal air. This is preferred after a long dive because, helium which is less soluble that nitrogen in the blood leaves the body faster than nitrogen, and does not leads to the formation of bubbles upon decompression, blocking the circulation of blood as does nitrogen.

- Used in industry to provide an inert atmosphere in electric arc welding of metals

Neon

- Used in signs and fluorescent lighting as it emits an orange-red glow when an electric current passes through it at low pressure.

- Is valued as a lighting system because it is usable in cold places. That is also the reason why the element is used in aircraft beacons and aircraft.

- Can also be used as a cryogenic refrigerant.

Argon

- Most abundant of the noble gases, it is used in electric light bulbs and fluorescent tubes due to its ability to stop white hot metal filament from reacting with oxygen and snapping.

- Used in winemaking to displace oxygen in barrels and thus prevent the formation of vinegar. Similarly, it is used in restaurant, bar and home wine dispensing units to allow storage of opened bottles without degradation of the contents

- Used to perform precise cryosurgery, which is the use of extreme cold, to selectively destroy small areas of diseased or abnormal tissue, in particular on the skin.

- Used to provide a protective atmosphere for old documents to prevent their degradation in storage and while on display.

Krypton

- Used in some lasers and photographic flash lamps.

- Is also used in fluorescent tubes and in the stroboscopic lights which flank airport runways since this type of lighting can penetrate dense fog.

Xenon

- Is used to fill fluorescent tubes and light bulbs used in light houses.

- Used as an anesthetic in surgical procedures

Radon

- Used as a cancer treatment in medicine, where the gas as a source of gamma rays is sealed in small capsules, which are then implanted in the body for the purpose of destroying malignant (cancerous) growths.

- Frequently used as a therapeutic treatment for arthritis in many European countries.

Identifying the presence of the gases: Oxygen and Carbon Dioxide

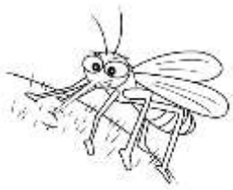
- Oxygen will relight a glowing splint.
- Carbon dioxide will extinguish a burning splint and will turn colourless ‘lime water – calcium hydroxide’ cloudy white.

PESTS

A pest is defined as any organism that has a harmful effect on human beings, their food or living conditions. Common household pests include: cockroaches, mosquitoes, flies, mice, rats and ants.

INTERESTING FACTS ON PESTS

- Can hold its breath for forty minutes
- Can survive being under water for half of an hour
- Can live a few weeks without a head
- Can run for up to three miles in an hour



- The average lifespan for a mosquito is less than two months
- They drink up to three times its weight in blood
- Sweat helps mosquitoes locate their victims

- Houseflies taste with their feet
- Houseflies are on an all liquid diet; they vomit on the food. Vomit contains digestive enzymes which liquefies the food enabling the fly to be fed.

- Mice eat 15-20 times a day
- Mice trails can be easily spotted due to them using the same route repeatedly to go back and forth every day to where it wants to go

- The tails of rats keep them cool due to the expansion and contraction of blood vessels in their tails.
- Rat teeth never stop growing. Their teeth can growth up to five inches which enables them to gnaw through lead, cider blocks and aluminum sheets.

- Ants do not have ears. They ‘hear’ by feeling vibrations in the ground through their feet.
- Some ants can swim. They use their own version of the doggy paddle and can float for long periods of time.

SOURCES

Cockroaches: http://www.pestworld.org/news-hub/pest-articles/fascinating-cockroach-facts/

Mosquitoes: https://www.megacatch.com/mosquito-faqs/mosquito-facts/

Houseflies: https://www.thoughtco.com/fascinating-facts-about-house-flies-4046014

Mice: https://www.pets4homes.co.uk/pet-advice/fun-interesting-facts-about-mice.html

Rats: https://www.terminix.com/blog/education/facts-about-rats

Ants: http://pestworldforkids.org/pest-guide/ants/

http://www.rentokil.com/blog/10-interesting-facts-about-ants-you-need-to-know/#.WV0k4dTyvcs

GROUP ACTIVITY

Instructions: -

Use the following definitions below to determine the habitat, diseases caused and pest controlled methods for each pest mentioned in the table entitled 'Common Household Pests'.

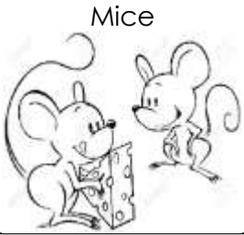
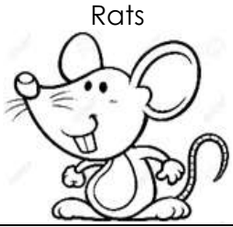
Definitions

Habitat – The area where the pest normally lives

Diseases caused – Any illness caused by the pest

Pest controlled methods – Methods used to get rid of pests

Common Household Pests

PEST	HABITAT	DISEASES CAUSED	PEST CONTROLLED METHODS
Cockroaches 			
Mosquitoes 			
Flies 			
Mice 			
Rats 			

The Dirt on Soil

WHAT IS SOIL?

Soil – uppermost layer of the earth's surface that plants grow in, and which provides them with physical support and nutrients.

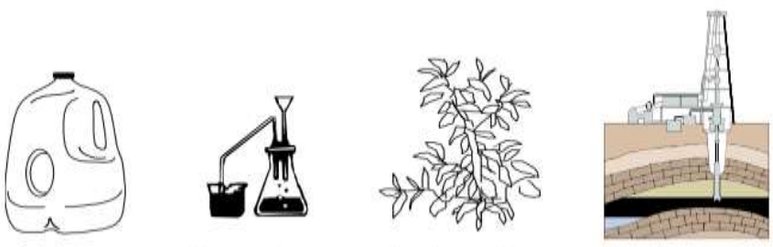
Soil is one of our most useful natural resources. From the soil we get food, clothes and materials for the houses we live in. From gardens and truck farms we get vegetables. Fruit grown on trees and vines come from orchards, groves, and vineyards. Trees also give us valuable lumber and the wood can also be used to make paper, paints and numerous other products. Planted field crops of wheat and corn are used for making flour to make our bread, crackers, pasta, and so many other foods. Nuts and berries come from our farms and forests.

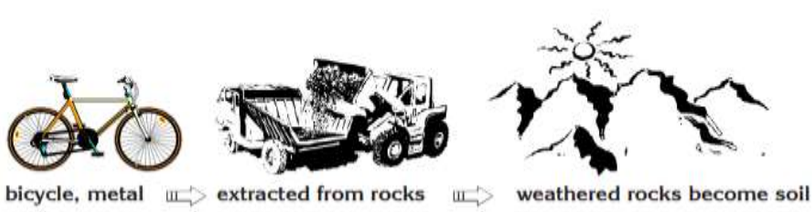
Our animal food also comes from the soil. Cows eat grass, hay, silage, and grain to produce milk, meat, and leather products. All animals eat plants; plants grow in the soil. In addition to the products listed above, animals supply us with by-products that are used in paints, camera film, pet food, rubber, crayons, lotions, soaps, leather, medicines, and, the list is long. The fuel that warms our houses comes indirectly from the soil. Coal is made from plants that grew ages ago. Oil and gas also originate from organic materials, possibly including the remains of animals. Some of these things grew in the soil at one time or lived on things that grew in the soil.

Fish from the sea, rivers and lakes live on plants (some on other fish). And these plants require dissolved minerals that are washed into the sea, rivers, and lakes from the soil. There are a few exceptions to linking things back to the soil. Here are a few examples: a volcano, the ocean (even though plants are part of the water cycle), and the sky (although plants give off oxygen for the air in the atmosphere).

Draw a flow chart back to the soil for...

butter	plastic cup	table
wool blanket	book	bubble gum
ice cream	brick house	baseball
leather shoes	skateboard	pickle
electricity	toothbrush	cereal
vegetable oil	turkey sandwich	rope
farmer's bank account	egg	road
well water	blue jeans	apple
chocolate cake	candy bar	soda pop
glass plate	bicycle	pencil





Common organisms present in soil

Plants and animals play a major role in soil development. Plants are the primary source of organic matter. They provide a protective covering which traps water and allows it to enter or infiltrate into the ground. The protective covering also lessens the erosion of the

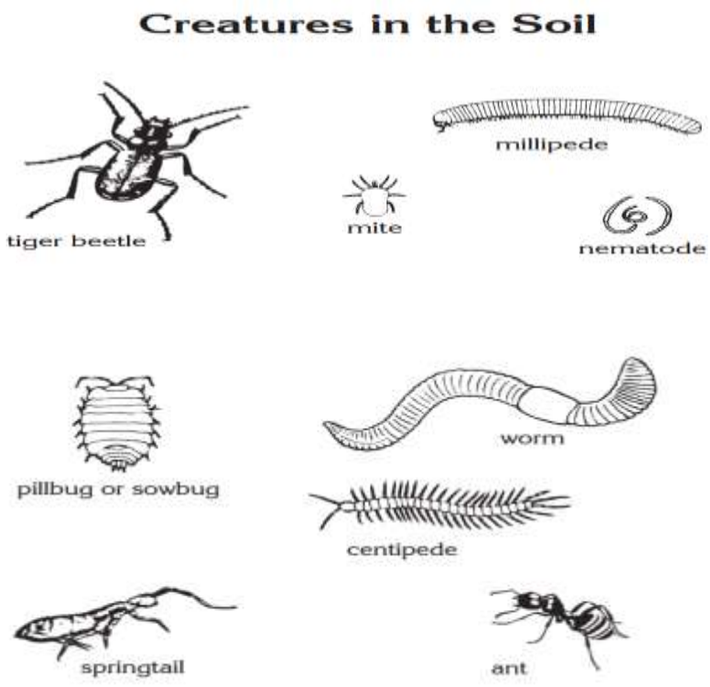
developing soil underneath. But perhaps most important, plants accelerate the process of chemical weathering through the release of carbon dioxide from respiring plant roots. In soil, carbon dioxide (from the plants roots) combines with water to form weak carbonic acid

which chemically decomposes mineral matter releasing plant nutrients and other constituents

into the soil solution. A multitude of animals, insects, and microorganisms also contribute to the process of

soil formation. The burrowing, eating, and mixing activities of invertebrates such as insects

and earthworms, and small mammals allow organic matter on the surface to become incorporated into the soil.



Classify common organisms present in soil

How do scientists classify living things?

The members of each group of living things share a set of special features unique to that group.

For example, plants contain a chemical called chlorophyll that they use to make their own food (it also makes them green). Every member of the plant kingdom shares this characteristic.

Scientists are always looking for these characteristics or 'observable features' which allow them to group different species together and see how they are related to each other.

SUGGESTED TEACHING ACTIVITY

Collect a soil sample and identify and classify the organisms present; display the data collected in the form of a graph.

TYPES OF SOIL

Soil contains different components, including:

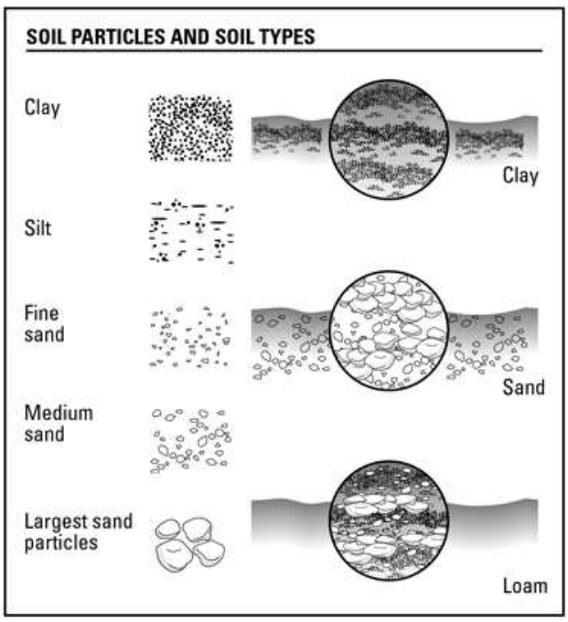
- mineral particles of various sizes
- living organisms - such as earthworms
- dead material
- water
- air

Different soils

Clay particles are smaller than sand particles. Different soil types contain different amounts of these mineral particles. The size of the gaps between particles is a determining factor in the amount of air and water in a soil. **Humus** is partly-decayed dead material.

The table below summarises some differences between **clay soil**, **sandy soil** and *loam*.

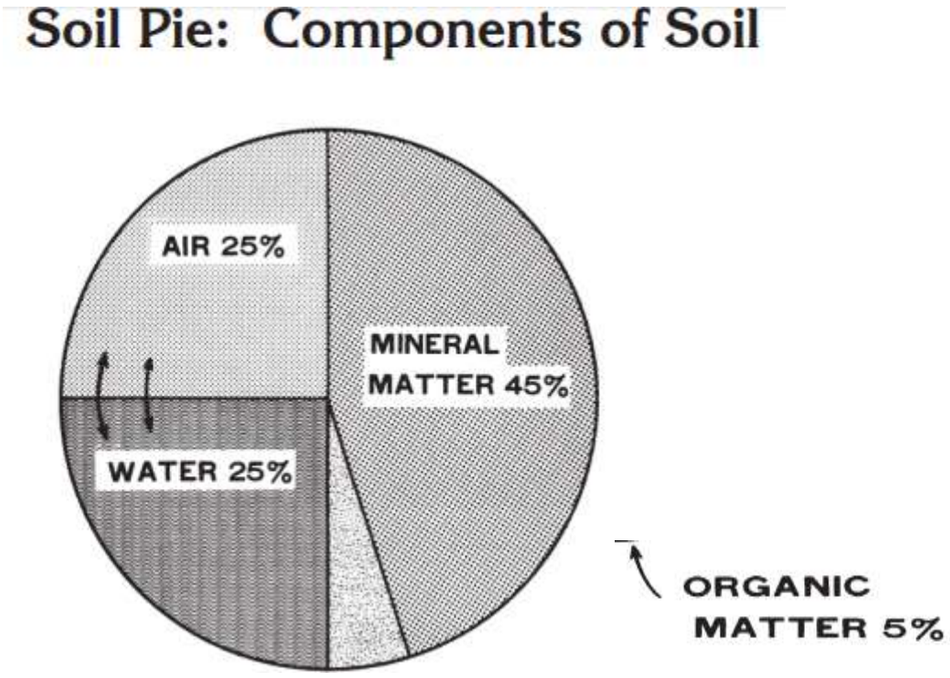
Type of soil	Typical particle size
Clay soil	Small
Sandy soil	Large
Loam	Mixture of small and large



Suggested Teaching Activity

Carry out simple experiments to compare properties of soil e.g. **Water content, Humus content and Air content**

http://www.bbc.co.uk/schools/gcsebitesize/science/triple_ocr_gateway/beyond_the_microscope/life_in_soil/revision/2/



What is soil conservation?

It is the process or activities we can do or apply to our use of soils and lands to ensure their sustained health and quality.

THREE REASONS WHY SOIL CONSERVATION IS SO IMPORTANT

1. **The soil is literally the foundation of plant life.** A tree will not be a tree without soil. While there are some plants that can live in water or air, most plants need to be rooted to the ground.

2. **It is the soil that provides nutrition to this plant life.** It is through this vegetation that nourishes the humankind and the animal kingdom. Plants are important resource of food and fuel and of wood and other by-products that make our other life functions possible.

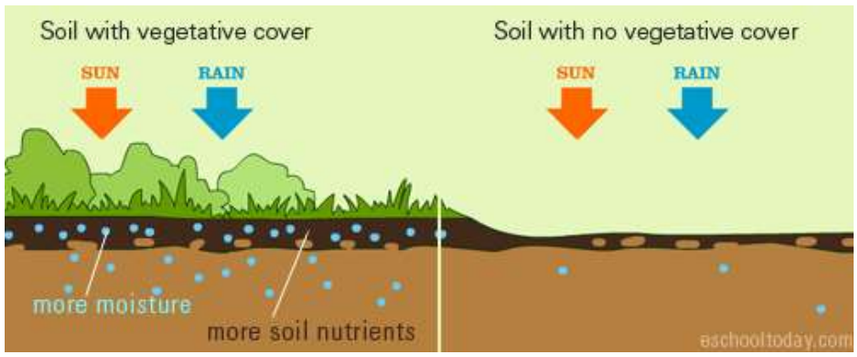
   The soil additionally supports the animal kingdom. Our agriculture also relies on soil, for its location and for other functions to be derived from its existence. It will be almost impossible to support the animal and human life without land.

3. **The soil is necessary for water supply**. This is the magic of nature. The land is also necessary to ensure the quality of water we derive from our earth. Soil and water co-exist. So do we and soil co-exist? Taking good care of our soil equates to taking care of our water supply.

Methods of Soil Conservation

Unfortunately, soils are under threat in many ways, from excessive farming practices, use of chemicals during agricultural practices, water, land and air pollution, erosion and so on. These upset the natural function of soils and affect many ecosystems that depend on it for survival but there are some ways to reduce these problems

1. Planting vegetative cover:



The root systems of vegetative cover, holds soils in place and prevents wind and water erosion. It also ensures its supply of organic matter from dead leaves and dropping of animal waste. Vegetative cover also shelters the soils from excessive heat form the sun. It helps to reduce evaporation and retain soil moisture, needed for the breakdown of organic matter.

2. Careful waste disposal and management:

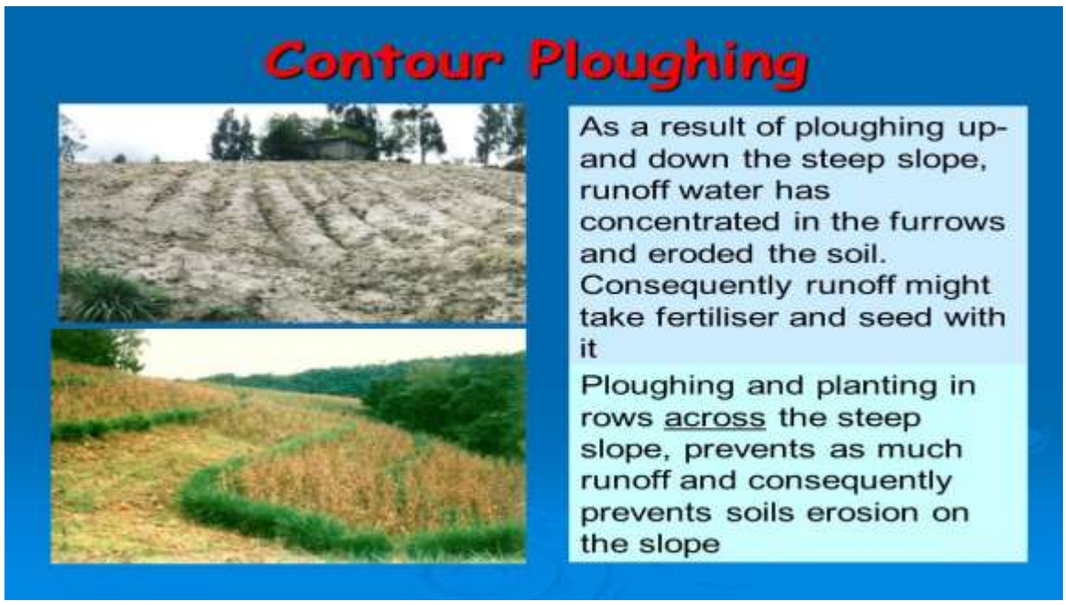
When we recycle more and compost our food waste, we reduce the number of contaminants that we introduce to soils. We also give back to the land, rich humus from composts that we do. Therefore, we need to manage our waste well to ensure that our soils are alive and healthy.

3. **Farming practices:**

Terrace farming

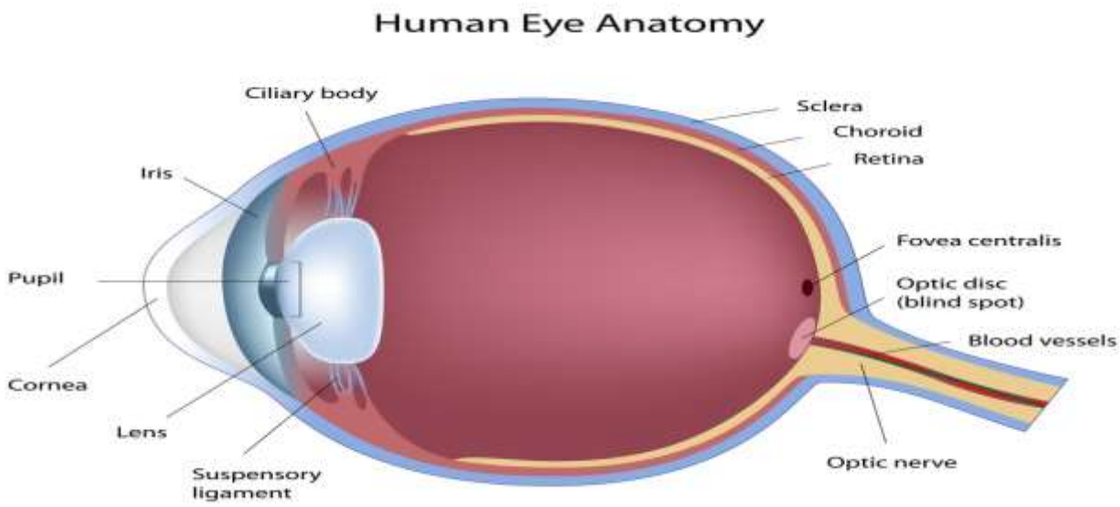
In terracing, many terraces are cut along the hill slope.These are made on the steep slopes so that flat surfaces are available to grow crops. They can reduce surface run-off and soil erosion

- **Contour Ploughing**
  If ploughing is done at right angles to the hill slope, the ridges and furrows break the flow of water down the hill.
  This prevents excessive soil loss as gullies are less likely to develop and reduce run-off so that plants receive more water.



- **Crop Rotation**
  Crop rotation is a practice in which a different crop is cultivated on a piece of land each year.This helps to conserve soil fertility as different crops require different nutrients from the soil. Crop rotation will provide enough time to restore lost nutrients.

CCSLC-MODULE -4 –THE EYE



A table showing the parts of the eye, a description and their function

Structure	Description	Function
Cornea	Translucent layer of tissue at front of eye	Bends light to bring it into focus on the retina
Iris	Coloured part of eye which is a ring of muscle.	Regulates the amount of light entering the eye
Pupil	Opening in the middle of the iris through which light enters	Regulates the amount of light entering the eye
Lens	Sac of fluid	Changes shape to allow images to be focused on the retina
Sclera	The tough, white coat of the eye	Protects the inner structures of the eye
Retina	The inner layer of the eye which contains light-sensitive cells	Changes light into electrical impulses to be forwarded to the brain
Optic nerve	A bundle of nerves fibers	Transmits electrical impulses from the eye to the brain
Aqueous humour	Clear fluid filling space between the cornea and the lens	Keeps the shape of eye
Vitreous humour	Viscous fluid which fills the space between the lens and the retina	Maintain pressure in the eye
Blind spot	Area of the retina where the retina meets the optic nerve. No rods or cons found here.	

Accommodation

Ability of the eye to change the shape of its lens to bring objects into focus on the retina

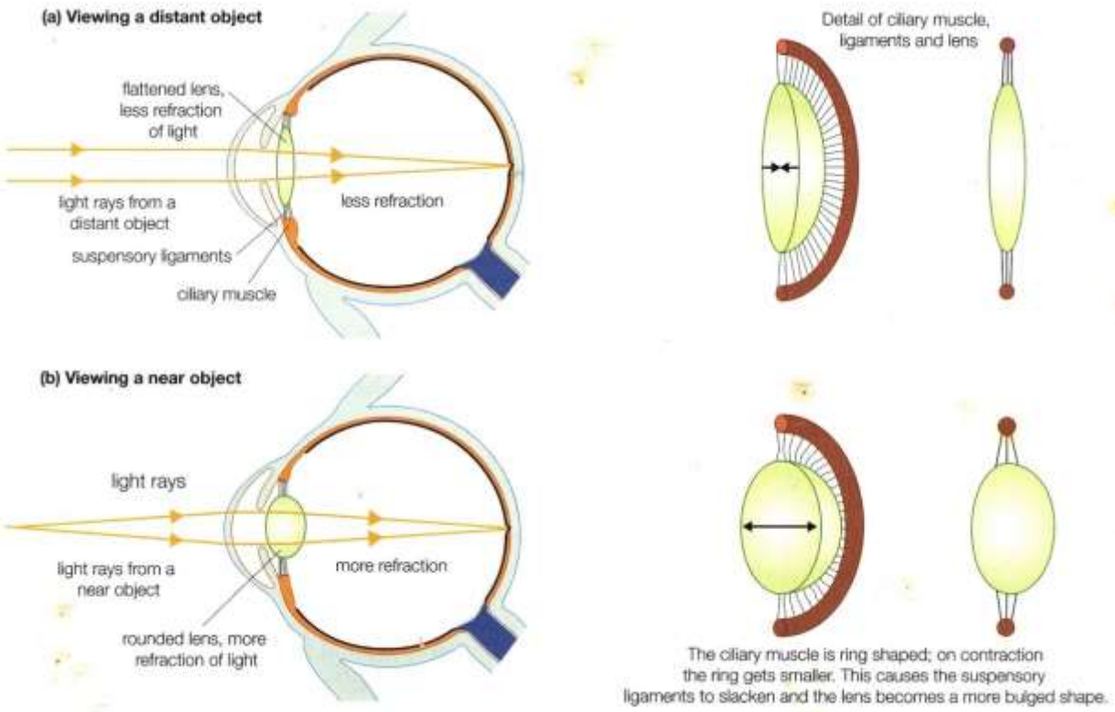
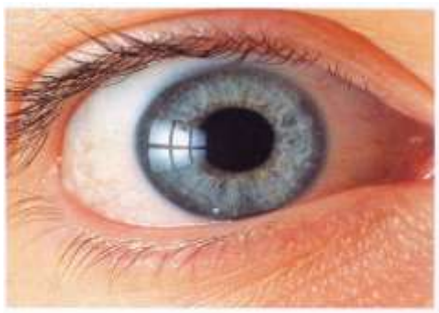


Figure 11.8 Accommodation: the way the lens adjusts to view near and distant objects.

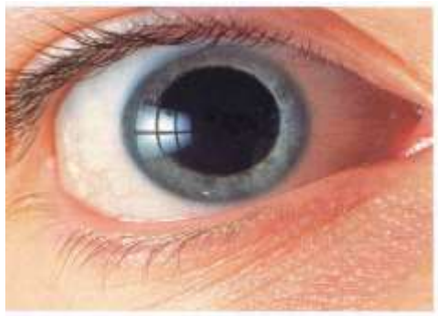
Response of the eye to changing light intensity

The iris contains muscles which contract and relax to cause the pupil to become larger or smaller.

In bright light- the pupil gets smaller to reduce the amount of light entering the eye



In dim light- the pupil gets larges to allow more light to enter the eye



Vitamin A and eyesight

Vitamin A is needed for the maintenance of healthy cells in the eye and converting light into electrical signals to the retina

Sources of vitamin A - liver, butternut squash, carrots, papaya, mangoes, pumpkin, spinach

Common eye diseases

Complete the following tables

Common eye diseases	Effects of disease
Cataract	
Glaucoma	
Far-sightedness	
Short-sightedness	

Importance of protecting the eye

Your eye allows you to gather information about the environment which assists with keeping us safe.

The eye should be protected from injury, we should

1. Reduce eyestrain. How should we reduce eye strain?

_____

_____

_____

2. Wear sunglasses. Why should we wear sunglasses?

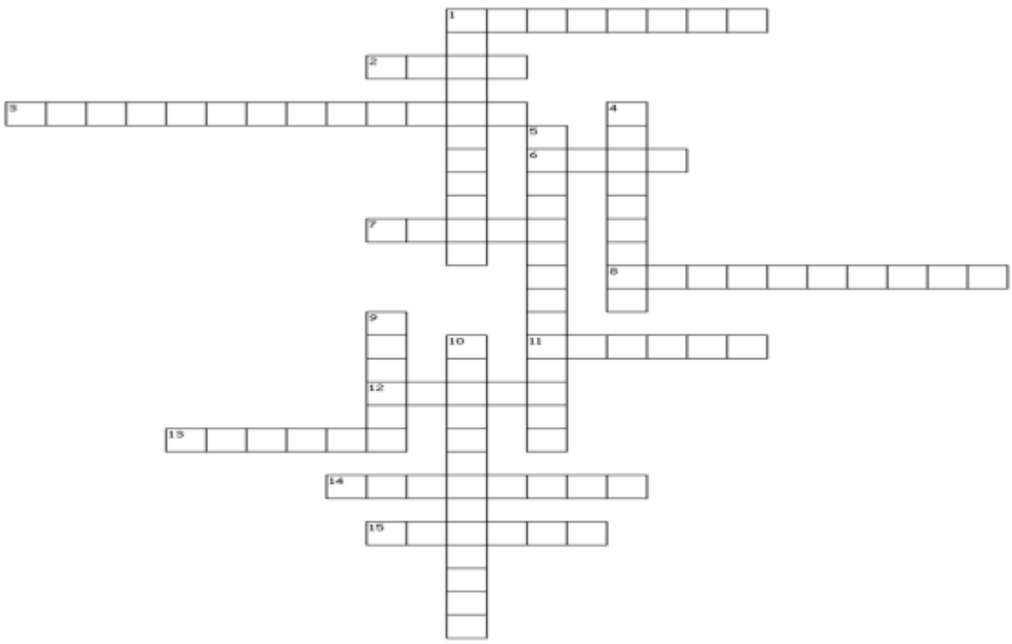
_____

_____

_____

3. Wear goggles when engaged in sporting activities or around flying debris or corrosive chemicals

Complete the cross word of the eye



Across

1. lens becomes opaque with this disease
2. changes shape during accommodation
3. the liquid found at the front of the eye
6. the coloured area of the eye
7. most of the light entering the eye is focused here
8. sends electrical signals to the brain
11. eyeball is located here
12. controls the amount of light entering the eye
13. contains rods and cones
14. upside down
15. refracts the light that enters the eye

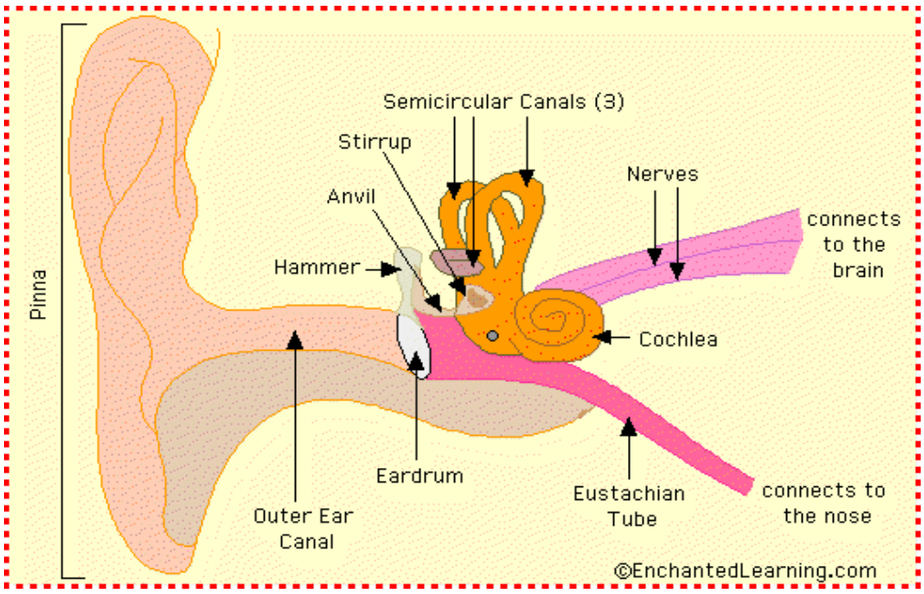
Down

1. protects the cornea
4. no rods and cones found here
5. contract and relax to help to focus light in the eye
9. another word for short sightedness
10. another word for long sightedness

CCSLC-MODULE 4-The Ear

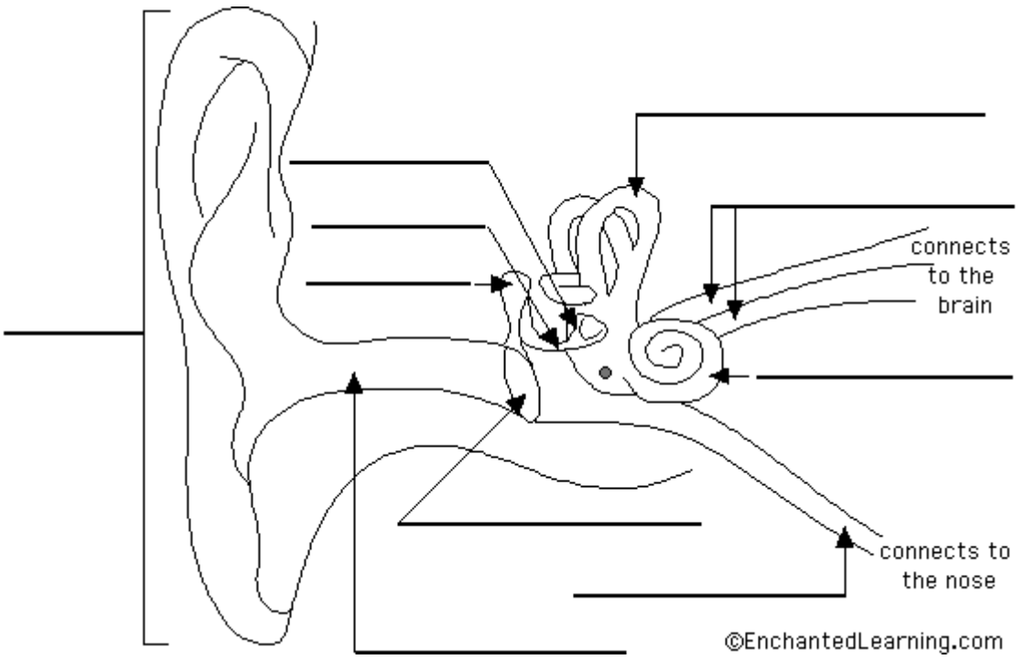
(part source: http://www.enchantedlearning.com/subjects/anatomy/ear/)

Sound is collected by the pinna (the visible part of the ear) and directed through the outer ear canal. The sound makes the eardrum vibrate, which in turn causes a series of three tiny bones called the ossicles (the hammer, the anvil, and the stirrup) in the middle ear to vibrate. The vibration is transferred to the snail-shaped cochlea in the inner ear; the cochlea is lined with sensitive hairs which trigger the generation of nerve signals that are sent to the brain. On average, people can hear sounds in the frequencies between 20 to 20,000 Hertz.



****Read the definitions below, then label the ear anatomy diagram.****

anvil - (also called the incus) a tiny bone that passes vibrations from the hammer to the stirrup. **cochlea** - a spiral-shaped, fluid-filled inner ear structure; it is lined with cilia (tiny hairs) that move when vibrated and cause a nerve impulse to form. **eardrum** - (also called the tympanic membrane) a thin membrane that vibrates when sound waves reach it. **Eustachian tube** - a tube that connects the middle ear to the back of the nose; it equalizes the pressure between the middle ear and the air outside. When you "pop" your ears as you change altitude (going up a mountain or in an airplane), you are equalizing the air pressure in your middle ear. **hammer** - (also called the malleus) a tiny bone that passes vibrations from the eardrum to the anvil.	**nerves** - these carry electro-chemical signals from the inner ear (the cochlea) to the brain. **outer ear canal** - the tube through which sound travels to the eardrum. **pinna** - (also called the auricle) the visible part of the outer ear. It collects sound and directs it into the outer ear canal **semicircular canals** - three loops of fluid-filled tubes that are attached to the cochlea in the inner ear. They help us maintain our sense of balance. **stirrup** - (also called the stapes) a tiny, U-shaped bone that passes vibrations from the stirrup to the cochlea. This is the smallest bone in the human body (it is 0.25 to 0.33 cm long).



The ear detects sounds in our environment and allows us to make decisions which are intended to preserve our lives. Damage to any part of the ear may result in hearing loss or deafness.

In the space below, write FOUR ways in which the ears can be protected from injury.

1.

2.

3.

4.

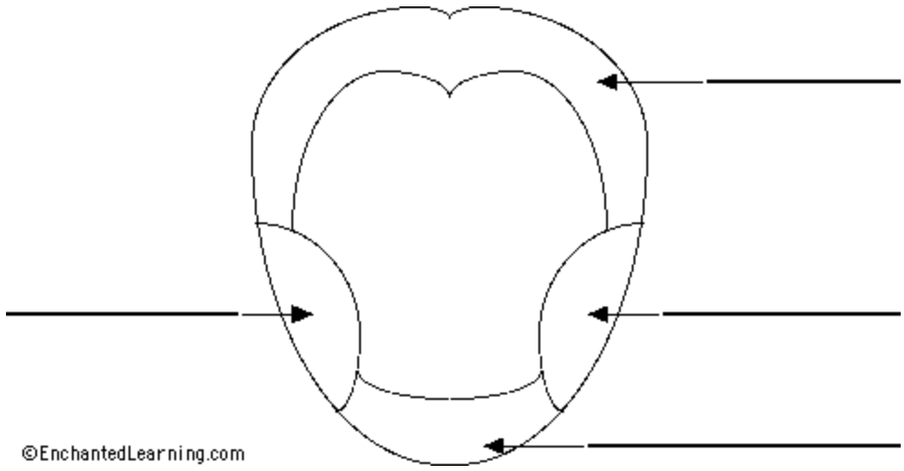
The Tongue

(part source:
http://www.enchantedlearning.com/subjects/anatomy/tongue/label/labeltongue.shtml)

The tongue is a strong muscle in the mouth that is covered with papillae (small bumps on the tongue) and taste buds (that sense bitter, salty, sweet, and sour tastes). The taste buds are clustered along the sides of the tongue.

****Read the descriptions, then label the tongue below.****

bitter - Bitter tastes (like the taste of tonic water) are mostly sensed towards the back and rear sides of the tongue.
salty and sweet - Salty tastes and sweet tastes (like sugar) are mostly tasted at the tip of the tongue.
sour - Sour tastes (like lemon juice) are mostly tasted at the sides of the tongue, at the middle and towards the front.



In the space below, name TWO OR MORE foods which have the following tastes.

Bitter:

Sweet:

Sour:

Salty:

How do we smell?

Smells and odours are detected when sensory cells in the nostrils are stimulated by particles of smells in the air which enter the nose. Being able to smell is important because it allows us to detect odours that are offensive, poisonous and corrosive. How something tastes is closely related to how it smells.

Think time!! - Can you explain why it is difficult to taste our food when we have a cold? Check the following websites for more information on the sense of smell:
https://www.intelihealth.com/article/how-does-our-sense-of-smell-work
https://www.youtube.com/watch?v=snJnO6OpjCs

CCSLC Module 4: NUTRITION

1. Important Definitions

Nutrition – food consumed by organisms to provide the substances needed to sustain life,

Food – any substance consumed to provide nutrients and energy.

Nutrient – a chemical needed by an organism to sustain life and growth; found in food.

Malnutrition – unbalanced diet; nutrients lacking, in surplus or in incorrect proportions.

Junk Food/Empty Calories – food with large amounts of calories but little nutritional value.

Meal – the food(s) consumed at a particular time of the day.

Balanced Diet – consuming all of the nutrients in the correct proportions.

Snack – a small portion of food eaten between regular meals

2. **Table 1: Caribbean food groups, the major nutrients in each food group and examples of the foods that contain these nutrients.**

Food Group	Major Nutrient(s)	Two Food Examples
Staples	Carbohydrates	Cereals (bread), root crops (sweet and English potato, cassava etc) and starchy fruits
Food from animals	Protein	Meat, fish, milk and cheese
Fats and Oils	Lipids	Butter, Avocado, Milk and Margarine
Vegetables	Minerals, Vitamins & Water	Tomatoes, Cabbage, String Beans, Spinach,Cucumber, etc
Fruits	Minerals, Vitamins&Water	Oranges, Mangoes, Guavas, Peaches, Water Melonetc
Legumes& Nuts	Protein	Beans, Peas & Nuts

3. **Table 2: Diseases that result from the deficiency of nutrients**

A deficiency disease is any disease caused by a lack of an essential nutrient. Deficiency diseases result from malnutrition.

Major Nutrient(s)	Disease/Deficiency
Carbohydrates	Hypoglycemia
Protein	Kwashiorkor, Marasmus
Lipids	Eczema, soft nails
Vitamins A	Night Blindness
Vitamins B	Weakness, numbness & Shortness of Breath
Vitamin C	Scurvy
Vitamin D	Rickets
Iron	Anemia

Iodine	Goitre
Water	Dehydration, Constipation, Elevated body temperature etc.

4. Table 3: Elements present in Macronutrients

Major Nutrient(s)	**Elements**
Carbohydrates	C, H , & O
Protein	C, H , & O
Lipids	C, H, O, N, & S

Key: **C** – Carbon, **H** – Hydrogen, **O** – Oxygen, **N** – Nitrogen, **S**– Sulphur

Preparing a Menu

Menu planning is the process of choosing dishes for a specified event or individual.

Types of Menus

- Breakfast- (offers fruits, juices, eggs, cereals, pancakes, waffles)
- Lunch - (features sandwiches, soups & salads; usually lighter than dinner menu items)
- Dinner - (more elaborate, steaks, roasts, chicken, sea food and pasta; wines, cocktails, etc..)

Example of a menu

Assignments

1. Write a description of each disease/deficiency, mentioned in Table 2.

2. Prepare a balance meal using pictures or models of actual food to be displayed on your plate using the Caribbean food groups.

3. Design and plan a menu for a special occasion or individual using Caribbean food groups.

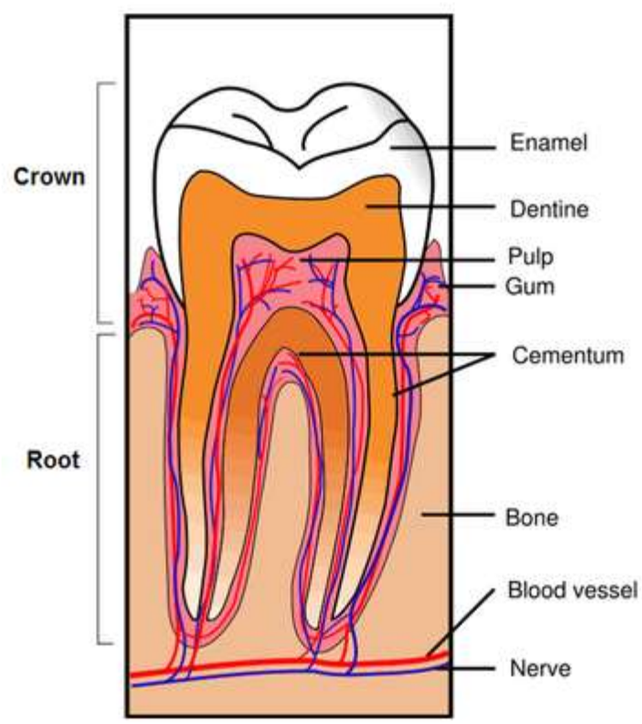
CCSLC-DIGESTION & TEETH

Introduction

Humans and animals have many different types of teeth. The teeth are designed for cutting and grinding food into smaller pieces (Mastication). This is mechanical breakdown of food.

Our teeth also will change with age. So, the teeth you have when you are a baby aren't the same as the one's you will have as an adult. Bacteria can ruin teeth and stop them from doing their job.

Parts of the Tooth



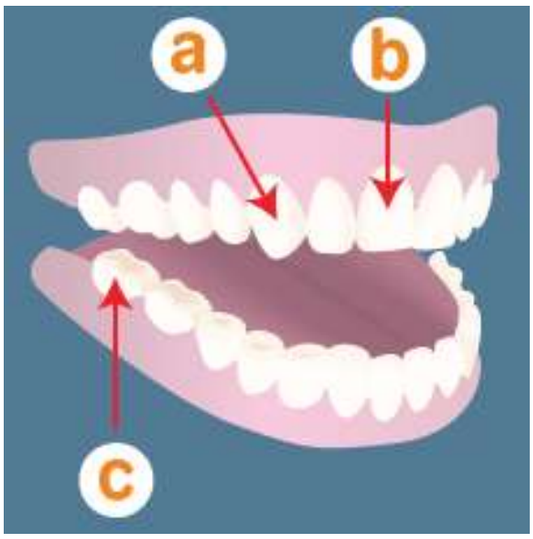
What Are the Different Parts of a Tooth?

- **Crown** — the top part of the tooth, and the only part you can normally see. The shape of the crown determines the tooth's function. For example, front teeth are sharp and chisel-shaped for cutting, while molars have flat surfaces for grinding.
- **Gumline** — where the tooth and the gums meet. Without proper brushing and flossing, plaque and tartar can build up at the gumline, leading to gingivitis and gum disease.
- **Root** — the part of the tooth that is embedded in bone. The root makes up about two-thirds of the tooth and holds the tooth in place.
- **Enamel** — the outermost layer of the tooth. Enamel is the hardest, most mineralized tissue in the body — yet it can be damaged by decay if teeth are not cared for properly.
- **Dentin** — the layer of the tooth under the enamel. If decay is able to progress its way through the enamel, it next attacks the dentin — where millions of tiny tubes lead directly to the dental pulp.
- **Pulp** — the soft tissue found in the center of all teeth, where the nerve tissue and blood vessels are. If tooth decay reaches the pulp, you usually feel pain.

Types of human teeth

	Incisor	Canine	Premolar	Molar
				
Position in mouth	Front	Either side of incisors	Behind canine	Back
Description	Chisel-shaped (sharp edge)	Slightly more pointed than incisors	2 points (cusps), 1 or 2 roots	4 or 5 cusps 2 or 3 roots
Function	Biting of pieces of food	Similar function to incisors	Tearing and grinding food	Chewing and grinding food

Humans have three main types of teeth:



- **a.** Canines - used for tearing and ripping food.
- **b.** Incisors - help you bite off and chew pieces of food.
- **c.** Molars and pre-molars - help you crush and grind food

How our teeth develop

Humans have two sets of teeth in their life:

1. Milk (baby) teeth

   These are the first set of teeth to grow. They start growing between six and ten months of age. A child will have around 20 baby teeth by the time he or she is three years old. 8 incisors, 4 canines, 8 premolars.

2. Permanent (adult) teeth

Baby teeth should begin to fall out by the age of six, leaving space for adult teeth to grow. An adult can grow up to 32 permanent teeth. 12 more teeth than an infant. All of which are molars.

Looking after our teeth

Sugar left in the mouth is eaten by bacteria. The bacteria make **acid** that rots teeth and cause tooth decay (cavities). Taking care of our teeth prevents tooth decay. You can take care of your teeth by:

- brushing twice a day/regularly
- flossing regularly
- snacking on hard crispy foods like apples
- eating the right foods (not too many sugary ones)
- visiting the dentist regularly

MODULE 4- Digestion in man

Introduction

Function: the mechanical and chemical breakdown of foods and the absorption of nutrients by cells.

It consists of: alimentary canal (9 m from mouth to anus) and accessory organs.

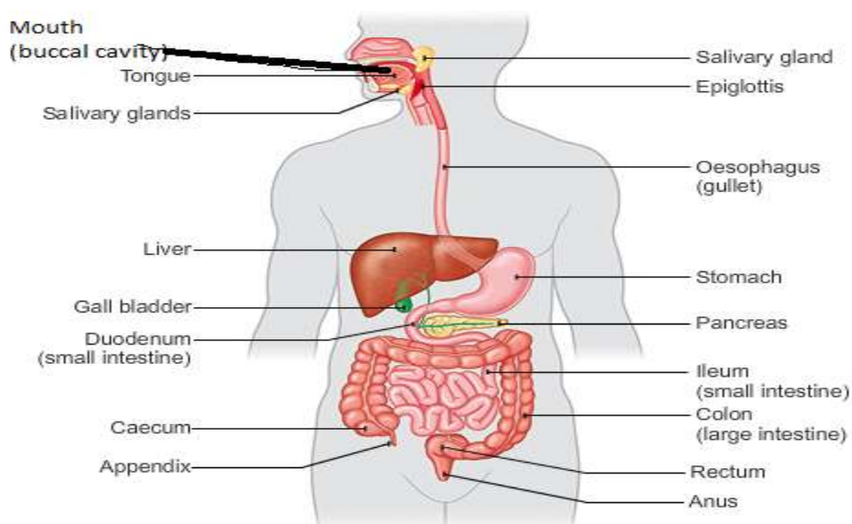
Physical/mechanical digestion

- This Involves the crush and churning of food and this takes place in the mouth by teeth and in the stomach by the movement of the stomach walls

Chemical digestion

- This is the chemical break down of food and the involve biological catalyst called enzymes.

General Characteristics of the Alimentary Canal



The alimentary canal is made up of the

- Oral/buccal cavity (mouth),
- pharynx,
- oesophagus,

- stomach,
- small intestines,
- and large intestines.

In addition to the alimentary canal, there are several important accessory organs that help your body to digest food but do not have food pass through them. Accessory organs of the digestive system include the

- teeth,
- tongue,
- salivary glands,
- liver,
- gallbladder,
- and pancreas.

To achieve the goal of providing energy and nutrients to the body, six major functions take place in the digestive system:

- Ingestion of food
- Secretion of fluids and digestive enzymes
- Mixing and movement of food and wastes through the body
- Digestion of food into smaller pieces
- Absorption of nutrients
- Egestion of wastes

Ingestion

The first function of the digestive system is ingestion, or the intake of food. The mouth is responsible for this function.

Secretion

In the course of a day, the digestive system secretes around 7 liters of fluids. These fluids include saliva,

- mucus,
- hydrochloric acid,
- enzymes,
- and bile.

Saliva moistens dry food and contains salivary amylase, a digestive enzyme that begins the digestion of carbohydrates.

Mucus serves as a protective barrier and lubricant inside of the GI tract.

Hydrochloric acid helps to digest food chemically and protects the body by killing bacteria present in our food.

Enzymes are like tiny biochemical machines that disassemble large macromolecules like

- proteins into **amino acids**
- carbohydrates such as starch and sugar are broken into **glucose**
- and lipids into **fatty acids and glycerol**

Finally, bile is used to emulsify (to mix liquids together to form an emulsion.e.g. milk and butter are emulsions.) large masses of lipids into tiny globules for easy digestion.

Mixing and Movement

The digestive system uses 2 main processes to move and mix food:

Swallowing. Swallowing is the process of using smooth and skeletal muscles in the mouth, tongue, and pharynx to push food out of the mouth, through the pharynx, and into the esophagus.

Peristalsis. Peristalsis is a muscular wave that travels the length of the GI tract, moving partially digested food a short distance down the tract. It takes many waves of peristalsis for food to travel from the esophagus, through the stomach and intestines, and reach the end of the GI tract.

Digestion- Digestion is the process of turning large pieces of food into its component chemicals.

Mechanical digestion is the physical breakdown of large pieces of food into smaller pieces. This mode of digestion begins with the chewing of food by the teeth and is continued through the muscular mixing of food by the stomach and intestines. Bile produced by the liver is also used to mechanically break fats into smaller globules. While food is being mechanically digested it is also being chemically digested as larger and more complex molecules are being broken down into smaller molecules that are easier to absorb.

Chemical digestion begins in the mouth with salivary amylase in saliva splitting complex carbohydrates into simple carbohydrates. The enzymes and acid in the stomach continue chemical digestion, but the bulk of chemical digestion takes place in the small intestine thanks to the action of the pancreas. The pancreas secretes an incredibly strong digestive cocktail known as pancreatic juice, which is capable of digesting lipids, carbohydrates, proteins and nucleic acids. By the time food has left the duodenum, it has been reduced to its chemical building blocks—fatty acids, amino acids, monosaccharides, and nucleotides.

Absorption

Once food has been reduced to its building blocks, it is ready for the body to absorb. Absorption begins in the stomach with simple molecules like water and alcohol being absorbed directly into the bloodstream.

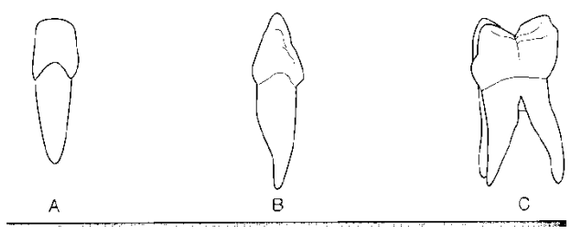
Most absorption takes place in the walls of the small intestine, which are densely folded to maximize the surface area in contact with digested food. The large intestine is also involved in the absorption of water and vitamins B and K before faces leave the body.

Egestion

The final function of the digestive system is the elimination of waste in a process known as defecation. Defecation removes indigestible substances from the body so that they do not accumulate inside the gut. The timing of defecation is controlled voluntarily by the conscious part of the brain, but must be accomplished on a regular basis to prevent a backup of indigestible materials (constipation).

WORKSHEET

1. i) Label the different types of human teeth shown below:



A _____B_____ C_____

ii) State the importance of each type of teeth in digestion:

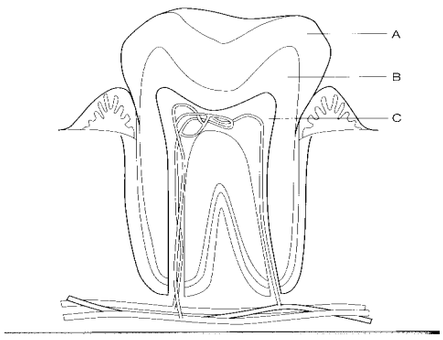
A_____

B_____

C_____

3 marks

iii) Label the internal structure of the tooth shown below:



A _____B_____ C _____ 3 marks

2. The figure below represents the human digestive tract in which food is digested as it passes through.

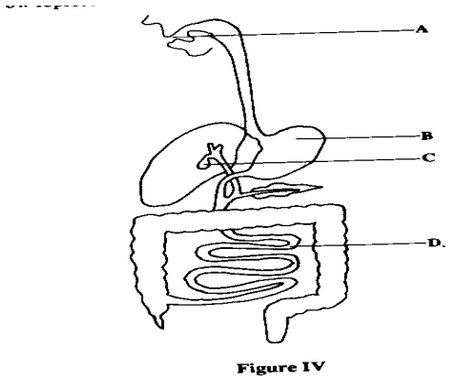


Figure IV

a) i) Name EACH of the structures labelled A to D.

A _____

B _____

C _____

D _____ 4 marks

ii) In which of the labelled structures is hydrochloric acid produced?

_____

1 mark

b) Excess hydrochloric acid in the digestive system sometimes results in a burning pain.

What kind of substance would neutralize the acid and thus stop the pain?

_____

2 marks

c) What is the function of the structure labeled C?

_____

_____1 mark

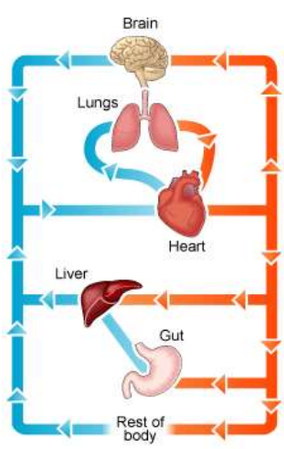
MODULE 4-THE CIRCULATORY SYSTEM

This is a group of organs which promotes the transporting of blood throughout the body.

The circulatory system is made up of three parts:-

- The heart, which is the pump;
- Blood which is the fluid being pumped and contains all the materials to be pumped around the body;
- The blood vessels, or 'pipes', through which blood flow to get to and from the cells – these are the arteries, veins and capillaries.

Flowchart of the circulatory system



Deoxygenated blood

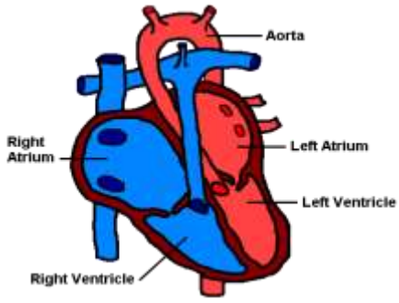
Oxygenated blood

Direction of blood flow

Parts of the circulatory system:-

- Heart

  The heart is a muscular organ that pumps the blood around the body. It is roughly the size of one's fist and is made up of four chambers.



- Blood

  This is a red fluid which supplies nutrients and oxygen to various cells of the body and takes waste products away from them.

  Deoxygenated blood – Blood which does not contain oxygen

  Oxygenated blood – Blood which contains oxygen

- Arteries

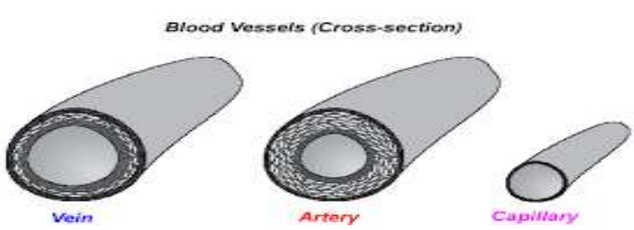
  These transport blood away from the heart. The walls of the arteries tend to be muscular and thick with small lumens. This is so because the blood in the arteries is under high pressure generated form the heart.

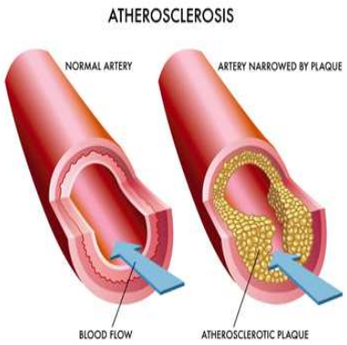
- Veins

  These transport blood to the heart. The walls of the veins tend to be muscular and thin with large lumens. This is so because the blood in the veins is under lower pressure than the blood in the arteries.

- Capillaries

  These allow food and oxygen to diffuse to cells and waste to diffuse from cells. They are not muscular but the lumen is large.





Discuss the above diagrams.

MODULE 4-Health and Well-being

Personal hygiene is the act of cleansing and grooming the external body to prevent contracting and spreading of diseases. It also allows one to be accepted socially.

TIPS

1. TAKE REGULAR BATHS

- Gets rid of body odors that aren't deemed to be pleasant
- Removes dirt, oils and bacteria that are present on the skin

2. BRUSH & FLOSS TEETH (ALSO VISIT THE DENTIST REGULARLY)

- This promotes brighter and whiter teeth along with fresher breath
- This lowers the risk of gum disease, loss of teeth, dental problems, plaque and tartar build up and staining of the teeth.

3. WEAR CLEAN CLOTHES

- When clothes become stained and dirty, bacteria start to work on these stains and make clothing smell.
- Wear dirty, filthy clothes can cause ailments and sicknesses and can spread diseases.

4. WASH HAIR REGULARLY

- This removes dirt and oil which can cause acne and pimples to occur on the face.

Kitchen Hygiene

Kitchen hygiene is the act of keeping the kitchen in a clean and sanitary state to prevent bacteria, infections and diseases from spreading. It also prevent food contamination.

TIPS

1. COVER HAIR WHEN DEALING WITH FOOD

2. CLEAN WORKING SURFACES BEFORE AND AFTER COOKING

3. CLEAN ALL NAILS (REMOVE ALL DIRT FROM UNDER NAILS AND PAINTED NAIL POLISH)

MODULE 4- MAINTAINING HEALTHY LIFESTYLES

To maintain a healthy lifestyle one should:-

i) Have adequate exercise

ii) Have proper personal hygiene

iii) Consume balanced meals

iv) Have adequate hours of rest

"What fits your busy schedule better, exercising one hour a day or being dead 24 hours a day?"

MODULE 5: ENERGY ISSUES

List of household items and farm machinery which are energy changers

Tractor, blender, washing machine, plough

The energy changes which occur in items above

Tv- electrical → light → sound and heat

Tractor-

Blender-

Washing -

Machine-

Plough-

Note: Efficiency of energy conversions in appliances will reduce wasted energy

Heat

Heat is a form of energy

Difference between heat and temperature

Heat is a form of energy and measures the total energy of all molecules in the substance while **temperature** is a measure of degree of hotness or coldness of a body.

HEAT	TEMPERATURE
1. It is a form of energy and measures the **total energy** of all molecules in the substance.	1. It is a measure of degree of **hotness or coldness of a body.**
2. Its unit is joule in **SI** and **calorie** in CGS.	2. The unit of degree **Celsius** or **Kelvin** or **degree Fahrenheit**.
3. Flow of heat doesn't depend upon the heat energy contained in bodies in thermal contact.	3. Flow of heat depends upon the temperature difference between two bodies. Heat always flows from a body at higher temperature to a body at lower temperature.
4. It is the **total kinetic energy** of all molecules in a substance.	4. It is a measure of **average kinetic energy** of molecules in a substance.

Expansion of solids liquids and gases

When heat is added to a substance, the molecules and atoms vibrate faster. As atoms vibrate faster, the space between atoms increases. The motion and spacing of the particles determines the state of matter of the **substance**. The result of increased molecular motion is that the object expands and takes up more space.

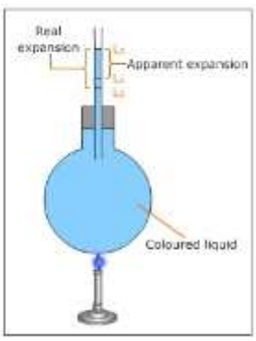
When a substance is cooled, the molecules and atoms vibrate _____. As atoms vibrate _____, the space between atoms_____. The motion and spacing of the particles determines the state of matter of the **substance**. The end result of_____ molecular motion is that the object _____ and takes up_____ space.

Experiments to shows expansion on heating

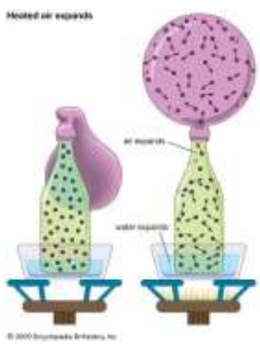
1) solids

Description:

2) liquids



3) gases

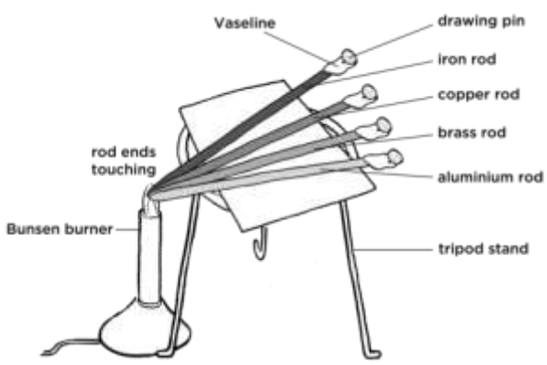


Everyday observation of the effects of thermal expansion

Electrical wires sag more on a hot day

Experiment to determine the rate at which a metal conducts heat

Description:



Recall the definition of conduction, convection, radiation and evaporation

Conduction- transfer of heat from source through a medium such as the metal base of a saucepan. Conduction usually **involves solids and these solids are usually in contract** with each other. **Air is a poor** conductor of heat. **Conduction heat** spreads through a substance when faster atoms and molecules collide with neighboring slower ones, **transferring** some of their kinetic energy to them.

Convection-transfer of heat by **fluid movement**. (fluids include liquids and gases). Example rising hot air takes heat via the hot air molecules up in the sky. Rising hot water in the saucepan takes the heat for the bottom of the saucepan to the top.

radiation- heat energy travelling through space. No solids, liquids or gases are needed to transfer heat by radiation. For example, include the heat from the sun travelling through space (a vacuum to reach us here on earth). Also, standing up in front of a burning fire heat is transferred by radiation.

The phenomenon of radiation in everyday life

cooking on a grill, sunbathing, drying clothes, heating substances

defining conductor and an insulator

Conductor- A substance that readily allows heat to past through it. Example copper, aluminum, _____

Conductors are used in _____

Insulator- A substance that does not allow heat to readily past through it. Example plastic, wood, _____

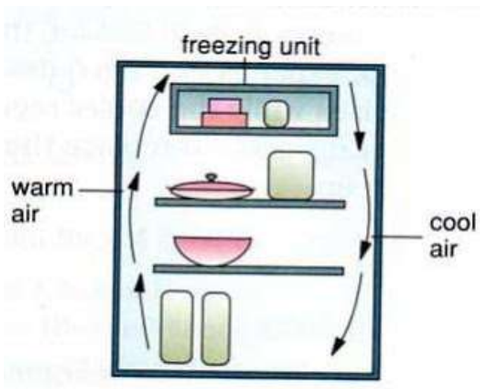
Insulators are used in_____

Instances where man uses heat transfer

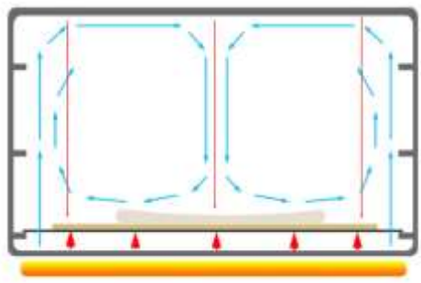
Cooking, drying clothes, sun-bathing

Relating the positioning of food in oven and refrigerator to the formation of convections currents

Refrigerator



oven



Convection current- the continuous sinking of cold air accompanied by the displacement of warmer air.

Insulating properties of air

Some animals trap a layer of air in their body covering (feathers or fur) to help prevent heat loss.

Importance of ventilation to people and animals

Natural Ventilation- Natural ventilation is the process **of supplying and removing air through an indoor space by natural means**, meaning **without** the use of a fan or other mechanical system (e.g AC units). It uses outdoor air flow caused by pressure differences between the building and its surrounding to provide ventilation and space cooling.

Artificial ventilation-

Increased temperature due to poor ventilation can interfere with cooling mechanism of sweating. Sweating causes water to evaporate from the skin this takes heat away as the hot water molecules as they leave the skin. Poor ventilation can result in elevated body temperatures which can lead to heat stroke.

Electricity

Electricity is created when electrons move or become mobile

Demonstration to show friction may lead to the buildup of static electricity

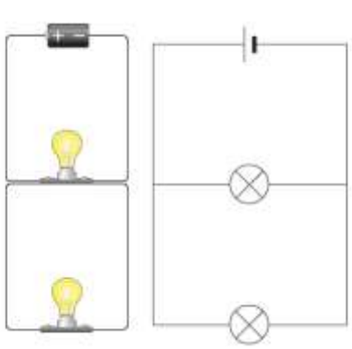
Rubbing of items against each other can lead to transfer of charged particles (static electricity). Rub a comb or inflated balloon with a piece of wool. This comb will now attack dust or chalk.

Sources of electricity

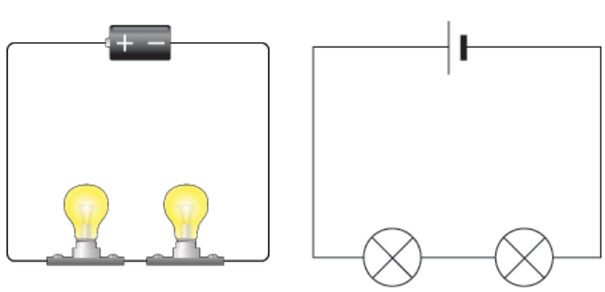
- Fossil fuels - coal, oil, natural gas (21%)
- Renewable energy- mainly hydroelectric (dams), wind, geothermal, solar
- Nuclear power
- Other sources (i.e., biofuels and biomass)

Parallel and series circuits

parallel circuit



series circuits



note: insert a drawing showing a switch open and one showing a switch closed

In a **series circuit,** electric flows along **one path**. In a **parallel circuit** electricity flows along **multiple paths.**

Advantages and disadvantages of a series circuit

Advantages: 1. Series circuits do not overheat easily. This makes them very useful in the case of something that might be around a potentially flammable source, like dry plants or cloth.
2. Series circuits are easy to learn and to make. Their simple design is easy to understand, and this means that it's simple to conduct repairs.
3. we can add more power devices, they have a higher output in terms of voltage.
4. The current that flows in a series circuit has to flow through every component in the circuit. Therefore, all of the components in a series connection carry the same current.

Disadvantages: 1. If one point breaks in the series circuit, the total circuit will break.
2. As the number of components in a circuit increases, greater will be the circuit resistance.

Advantages and disadvantages of a parallel circuit

Advantages: 1. Every unit that is connected in a parallel circuit gets equal amount of voltage.
2. It becomes easy to connect or disconnect a new element without affecting the working of other elements.
3. If any fault happened to the circuit, then also the current is able to pass through the circuit through different paths.

Disadvantages: 1. It requires the use of lot of wires.
2. We cannot increase or multiply the voltage in a parallel circuit.
3. Parallel connection fails at the time when it is required to pass exactly same amount of current through the units.

Safety around electricity and electrical appliances

The voltage of the electricity and the available electrical current in regular businesses and homes has enough power to cause death by electrocution. There are four main types of injuries: electrocution (fatal), electric shock, burns, and falls.

Care when interacting with electrical devices

- Ensuring that's hands are free of moisture
- Make sure that main switch is off when working on wiring
- Using rubber soled boots
- Wearing protective clothing
- Child-safety outlet caps

Possible issues which can result from mains electricity

Power outages, electrical fires, malfunctioning outlets, damage to electrical appliances

Fuses, circuit breakers, surge protectors, uninterruptible power supply (UPS), line conditioners

Fuses- The fuse breaks the circuit if a fault in an appliance causes too much current flow. The fuse contains a piece of wire that melts easily. If the current going through the fuse is too great, the wire heats up until it melts and breaks the circuit

circuit breakers- Its basic function is to interrupt current flow after a fault is detected. It protects an electrical circuit from damage caused by excess current, typically resulting from an overload or short circuit.

Uninterruptible power supply-is an electrical apparatus that provides emergency power to a load when the input power source or mains power fails.

line conditioners- not only act like a small store of power for equipment but they can also regulate over voltage down to the desired voltage.

Types of electric meters

1) Analogue (with dials) 2) digital with display screen

Reading analogue electric meters

- Read the dials from left to right
- If the pointer is between the two numbers, always take the lower number
- If the pointer is directly over a number, write down that one
- If the pointer falls between 9 and 0, write down 9 and reduce the reading you've already taken for the dial on its left by one. For example, if you originally recorded 5, reduce it to 4

Read the following meters

_____

_____

Calculating total for electricity bill

Cost = fees + usage X amount per kwh + fuel charge