

CBE GRADE 6

**SCIENCE AND
TECHNOLOGY**

LESSON NOTES

LIVING THINGS

- The term living thing refers to things that are now or once were alive
- A **living thing** pertains to any organism or a life form that possesses or shows the characteristics of life or being alive

PLANTS

- Plants are living things.
- The grouping of plants together with common characteristics or features is called the classification of plants.

TYPES OF PLANTS

Identifying different types of plants

Pupil's activity

Page 1

To observe the different types of plants

Pupil's activity

Page 1

To identify different types of plants found in the locality

Pupil's activity

Page 2-3

Types of plants found in the locality

1. Trees

- Are big plants
- They have single stem called trunk and many strong branches
- Examples of trees include mango, coconut and avocado trees

2. Shrubs

- Are shorter than trees
- They have many thin and woody stems
- Examples of shrubs include hibiscus, rose and cotton plants

3. Herbs

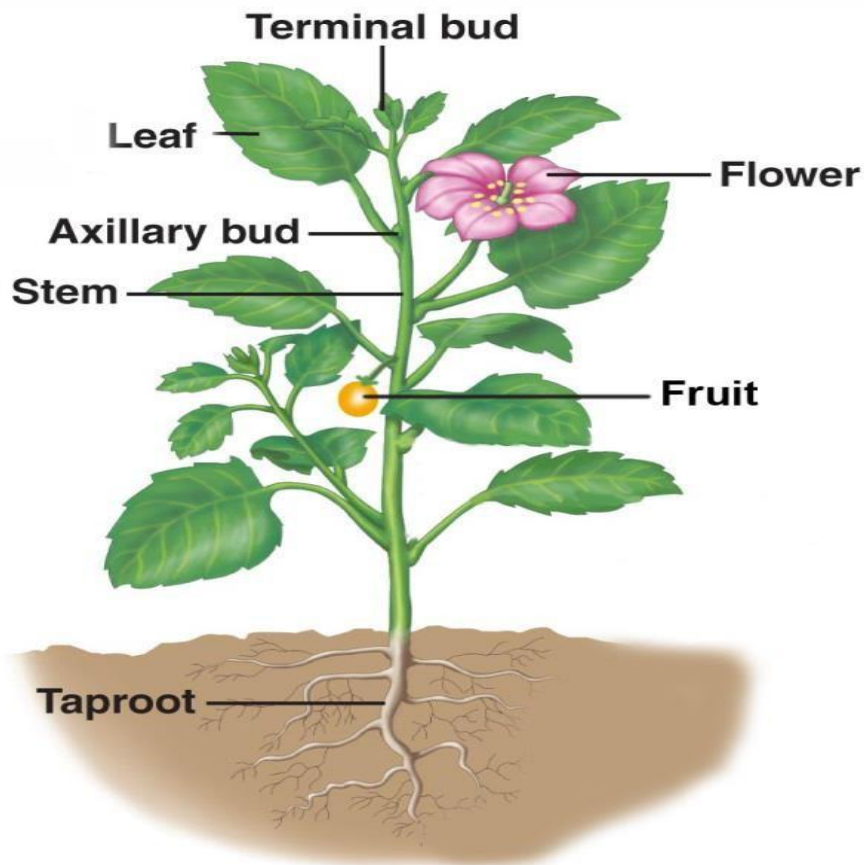
- Are small plants with soft green stems
- Examples of herbs include mint and coriander

4. Grass

- Is short and has narrow leaves

Parts of a plant

Identifying different parts of a plant



To name different parts of a plant

Pupil's activity Page 3

To identify different parts of plants growing in the environment

Pupil's activity

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To draw different parts of a plant

Pupil's activity

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□ The external parts of a plant include

1. Roots
2. Stem
3. Leaves
4. Flowers
5. Fruits
- 6.

Functions of different parts of a plant

To discuss the functions of different parts of a plant

Pupil's activity

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Part of a plant	Function
Leaves	

Stem	
Fruits	
Seeds	
Flowers	

Functions of the roots

Roots

1. Support/hold/anchor the plant firmly in the soil
The roots absorb water and mineral salts from soil through a process called absorption
Plants need water and mineral salts for proper growth
2. Absorption of water and mineral salts The roots hold the plants firmly in the soil
This ensures that the plants are not carried away by water or wind
3. Food storage
Some plants such as arrowroots, cassava and carrots store food in the roots

Functions of the stem

Stem –

1. Transports water and mineral salts from the roots to the leaves Carries food made by the leaves to the roots for storage
2. Holds or supports the upper parts of the plant in good position
3. Protects the plant
4. Storage of water- some plants such as a cactus store water in the stem
5. Some stems store food and water for the plant
N.B. Plants that store food in the stem are called stem tubers. Examples of plants that store food in the stem are: a) Cactus b) Sugar cane c) Irish potato

To investigate the absorption and transport of water and mineral salts in a plant

Pupil's activity

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Functions of the leaves

1. Breathing – Exchange of gases through small tiny holes called stomata.
2. Manufacture of food
Leaves make food for the plant using chlorophyll, sunlight, water and carbon (IV) oxide through a process called Photosynthesis – Process of making its own food

Requirements of photosynthesis are:- Chlorophyll – green colouring matter
Water
Carbon dioxide
Sunlight

3. Storage of food – Edible vegetables such as kales, cabbages, spinach
4. Removal of excess water through transpiration
Transpiration – Process in which plants lose excess water through small holes called stomata. Transpiration is high when it is hot, sunny, dry, windy. It is low when it's cold, wet, calm and rainy.

Function of flowers

- Flowers are the reproductive organs of plants
- They develop into fruits
- It bears fruits which contains seeds that germinate into a new plant
Seeds germinate into new young plants called seedlings

Function of fruits

1. Storage of food
Some plants like avocados, mangos and orange store food in fruits
2. Protecting seeds
In most plants, seeds are found inside fruits
The fruits protect the seeds from drying

Functions of seeds

When seeds germinate, they grow into new plants

To investigate transpiration in plants

Pupil's activity

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Making mounts of plants

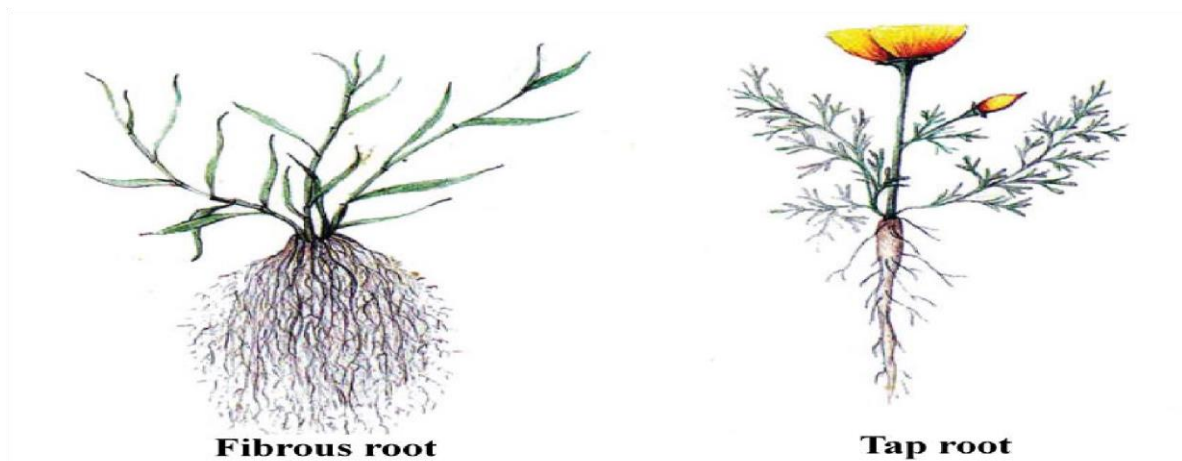
Pupil's activity

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TYPES OF ROOTS

There are two main types of roots

1. Tap root - extension of stem with side roots
2. Fibrous roots-many similar roots



To observe taproots and fibrous roots

Pupil's activity

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To collect plants with different types of roots

Pupil's activity

Page 13

Taproots	Fibrous roots
They consist of one main root that grows down into the soil They have lateral roots that arise from the main root	They do not have a main root All roots are similar and they arise from the same place
They grow deep into the soil	They are shallow
They grow vertically downwards into soil	They grow horizontally in all directions
<i>Plants with tap roots include:-</i> Legumes, Acacia, Fruit trees,	<i>Plants with fibrous roots include:-</i> Cereals, Oats, Grass, Sisal, Onions, Sugarcane, Coconuts

Grouping plants based on the type of roots they have

Pupil's activity

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Other types of roots Other

types of roots include:

- Aerial roots – for breathing
- Prop roots – used in maize for support

To mount different types of roots

Pupil's activity

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ANIMALS

Invertebrates

Categorizing invertebrates

Animals are classified into 2 main groups that is:-

1. Vertebrates.
2. Invertebrates.

Invertebrate

Are animals without backbone

Examples

1. Bees
2. Flies
3. Grasshopper
4. Earthworm
5. Lobster
6. Snail
7. Millipede
8. Fleas



Safety precautions to observe while handling invertebrates

Pupil's activity

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1. Do not touch the invertebrates. Some can sting or produce substances that can irritate the skin
2. Do not kill the invertebrates
3. Do not destroy the areas where the invertebrates live
4. Do not remove the invertebrates from where they live
- 5.

Identifying invertebrates found in the locality

Pupil's activity

To observe and identify invertebrates

Pupil's activity

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Name of the invertebrate	Where it was found
1.	
2.	
3.	
4.	
5.	
6.	
7.	

Characteristics of different invertebrates

To discuss the characteristics of invertebrates

Pupil's activity

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Name of the invertebrate	Number of wings	Number of legs	Number of feelers	Number of eyes	How it moves
1.					
2.					
3.					
4.					
5.					

To observe the characteristics of invertebrates

Pupil's activity

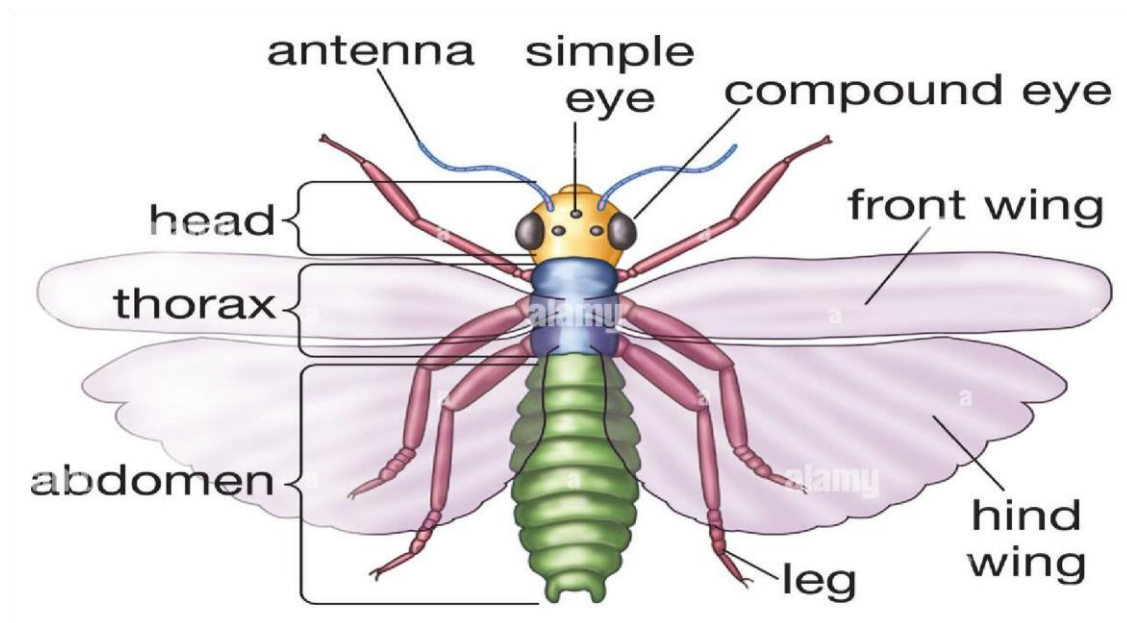
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Characteristics of insects

Name of the insect	Number of body parts	Number of wings	Number of legs	Number of antennae	How it moves
1. Louse					
2. bees					

3. butterflies					
4. termites					
5. mosquito					

1. Insects have 3 body parts 1. **Head**, 2. **Thorax**, 3. **Abdomen**
2. Insects have 3 pairs of legs
3. Most insects have 2 pairs of wings.
They use the wing for flying
Some insects such as beetles and ants do not have wings
4. Insects have a pair of antennae on top of their heads.
Antennae are also known as **feelers**
Antennae are long, thin and are used for sensing.
5. The body of an insect has a hard covering called **exoskeleton**

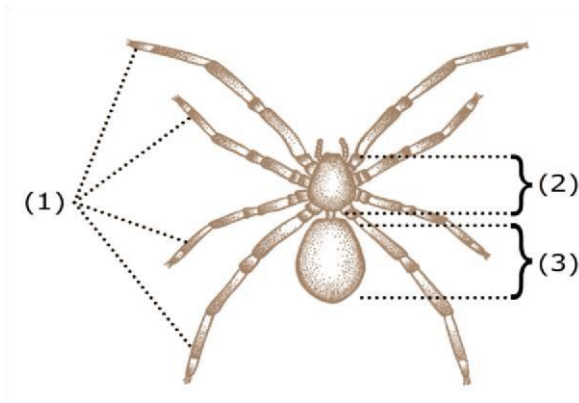
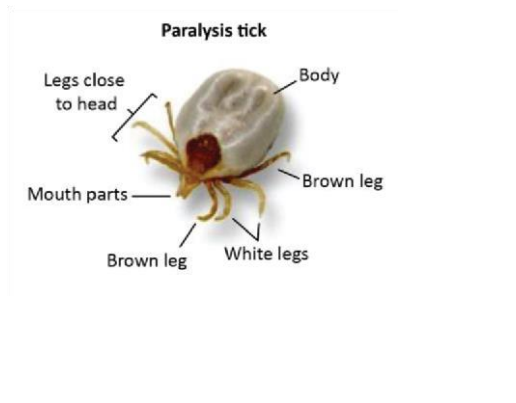


Characteristics of spiders and ticks

To discuss the characteristics of spiders and tick

Pupil's activity

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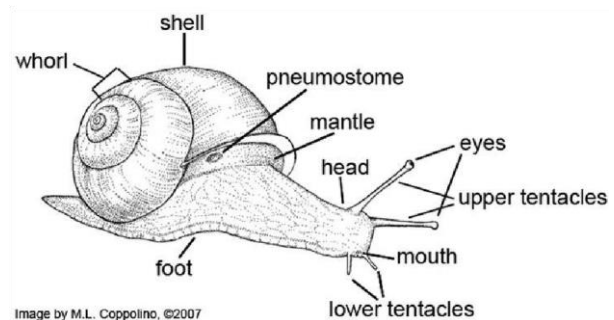
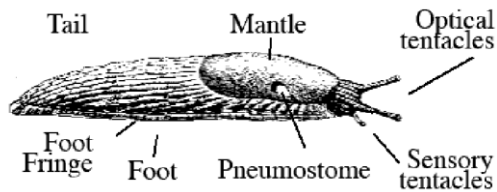


1. Spiders and ticks have 2 body parts
2. Spiders and ticks have 4 pairs of legs
3. Spiders and ticks do not have wings
4. Spiders and ticks do not have antennae

Characteristics of snails and slugs To discuss characteristics of snails and slugs

Pupil's activity

Page 29-30



1. Snails and slugs have soft body
2. Snails and slugs do not have wings
3. Snails and slugs have 2 pairs of feelers on their heads. The feelers are also called **receptacles**
4. Snails and slugs move by crawling on slimy mucus using the muscular foot

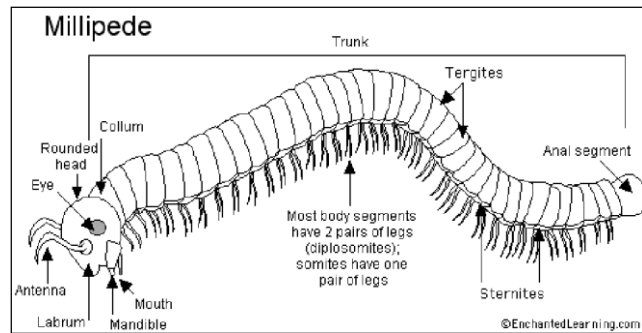
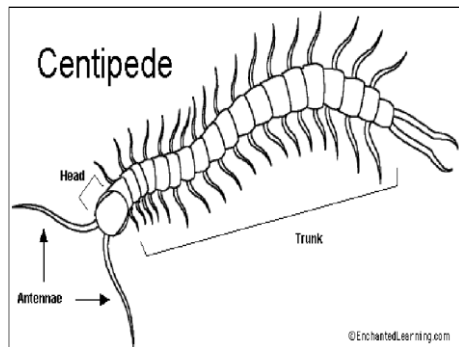
The slimy mucus is produced by muscular foot

Snails have shells while slugs do not have shells

Characteristics of centipedes and millipedes To discuss characteristics of centipedes and millipedes

Pupil's activity

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1. Centipedes and millipedes have 2 body sections- head and trunk
2. The trunk of both millipedes and centipedes is divide into many sections called **segment**
3. Centipedes and millipedes have many pairs of legs.
 - Centipedes have one pair of legs per segment, one leg on each side of the body. ➤ Millipedes have two pairs of legs per segment.
 - The legs are positioned under the body
 - Millipedes coil body when disturbed
4. Centipedes have one pair of antennae on the head

Importance of invertebrates to human beings

1. Source of food

Some insects such as termites are used as food by some people
Bees produce honey which is used as food

2. Pollination

Most flowering plants are pollinated by insects
Pollination enables to produce seeds

3. Cleaning the environment

Some invertebrates such as millipede feed on decaying matter turning it into compost.
This helps to clean up the environment
The compost makes soil good for growing crops

NB

Some invertebrates are harmful to human beings

Making a photo album of invertebrates in the locality

Pupil's activity

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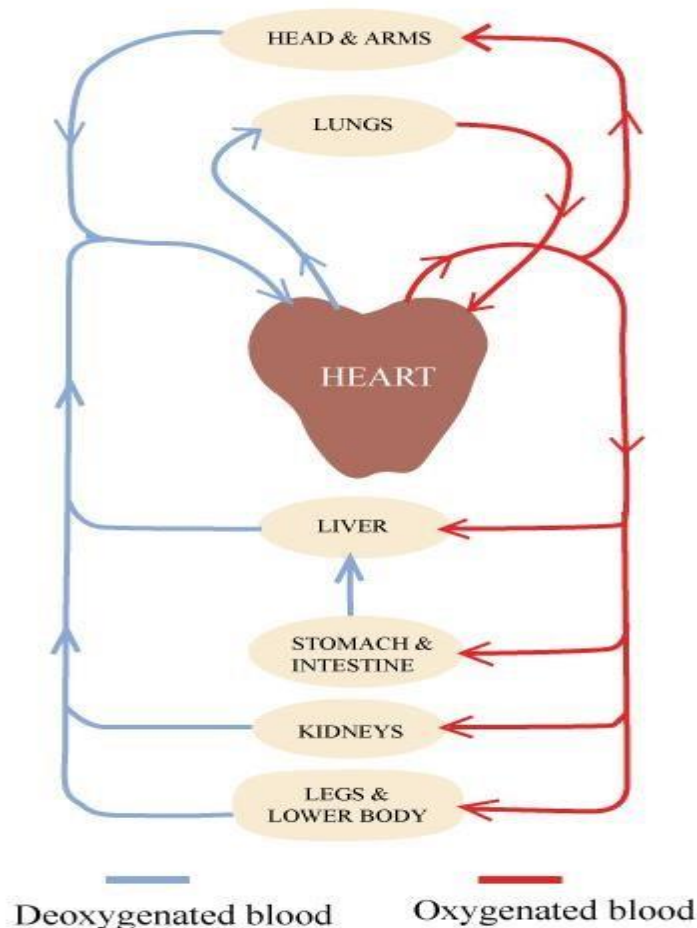
HUMAN CIRCULATORY SYSTEM

- Blood circulates throughout the body in a system known as the **circulatory system**
- The **heart**, **blood** and the **blood vessel** make up the circulatory system
- The heart is a muscular organ that pumps blood to all parts of the body. Blood circulates around the body in blood vessels
- **Blood** is a body fluid that is used in the transportation of substances within the body.
- **Blood vessels** are tubes in which blood flows

The main blood vessels are the **arteries**, **veins** and **capillaries**

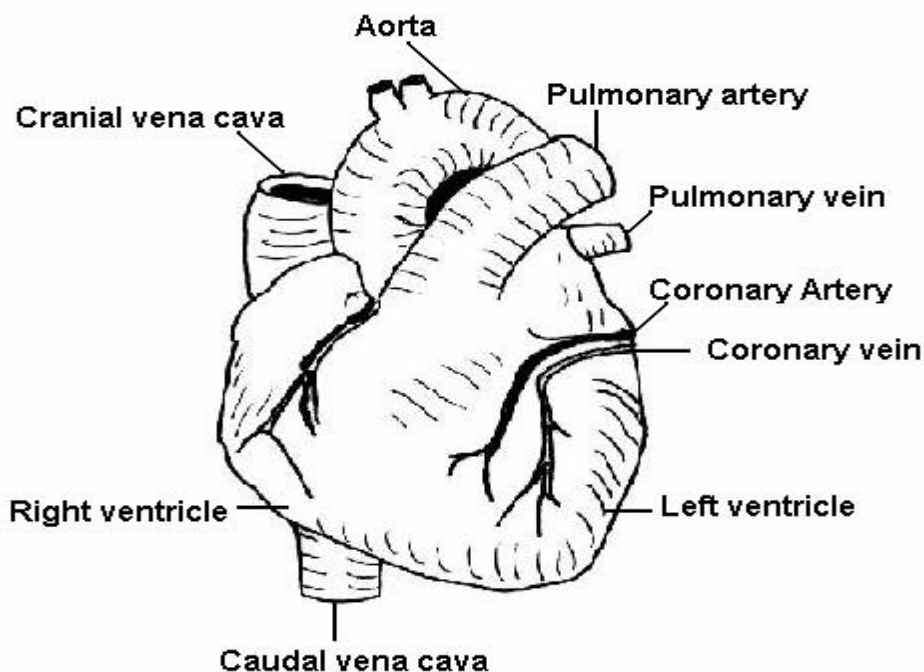
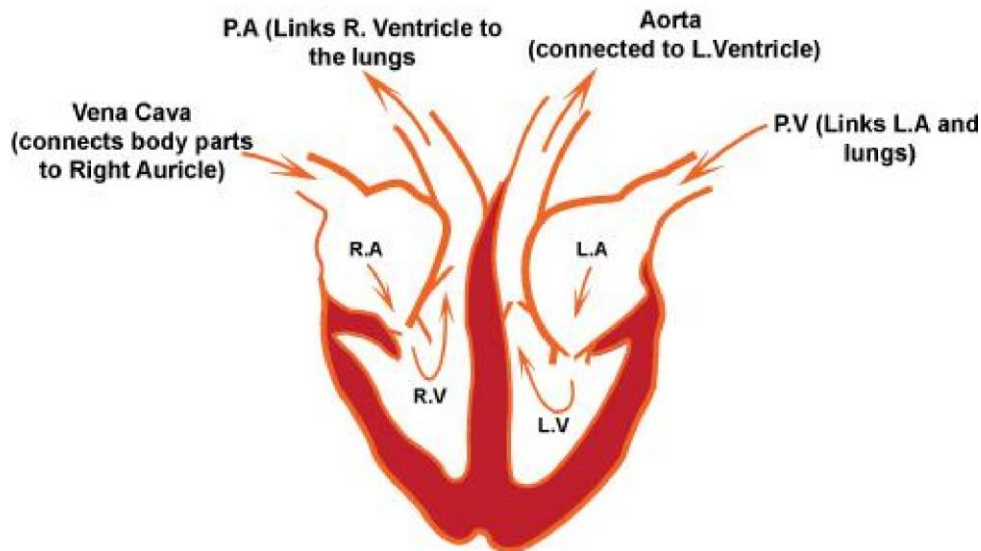
Main Parts of Human Circulatory System

- The circulatory system is important because it is involved in the transport of the following substances in the body.
- **Oxygen** from the lungs to all parts of the body
- **Digested food** from the small intestines to all parts of the body ➤ **Carbon dioxide** from the body to the lungs where it is breathed out.
- **Heat** from the liver to all parts of the body. This helps to regulate body temperature
- **Waste products** from different parts of the body to organs such as kidneys to be removed from the body.



Parts of the heart and their functions

THE HEART



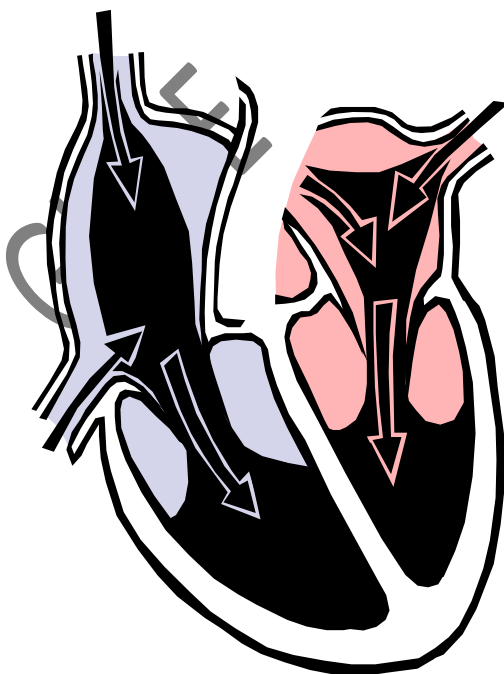
HEART - This is the organ that pumps blood throughout the body. It is muscular and placed between the lungs somewhere slightly to the left side of the body. The strong muscles of the heart can relax or contract when contracting the heart pumps blood with force. When the heart relaxes, the blood flows into chambers of the heart

- The heart has 4 chambers.
- The upper chambers are known as **auricles** and the lower chambers are known as **ventricles**.

- The heart has 2 auricles, the **left auricle** and the **right auricle** and 2 ventricles and the **right ventricle** and the **left ventricle**.
- Auricle have thinner walls than ventricles
- The function of the heart is to pump blood to all parts of the body
- Auricles receive blood from body organs and then empty it into the ventricles.
- The ventricles then pump blood to the lungs and to other parts of the body
- The heart has **valves** that prevent blood from flowing backwards ➤ The heart is connected to blood vessels

Pumping of the heart

1. The **right auricle** receives blood from the body
The blood then flows into the **right ventricle**
This blood does not have oxygen and is called **deoxygenated blood**
2. The **right ventricle** pumps the **deoxygenated blood** into the left into **lungs** through the pulmonary artery.
In lungs, the blood receives oxygen and becomes **oxygenated blood**.
3. The **oxygenated blood** flows from the lungs into the **left auricle** of the heart through the pulmonary vein
The blood then flows into the left ventricle
4. The left ventricle then pumps the oxygenated blood to all parts of the body(except the lungs) through the **aorta**
The left ventricle has thick muscular walls because they pump blood to all parts of the body
5. The heart has **valves** which prevent blood from flowing backwards



Types of blood vessels and their functions

Blood vessels are tubes that carry blood around the body.

The main blood vessels in the body are

1. Arteries

2. Capillaries
3. Veins

Arteries

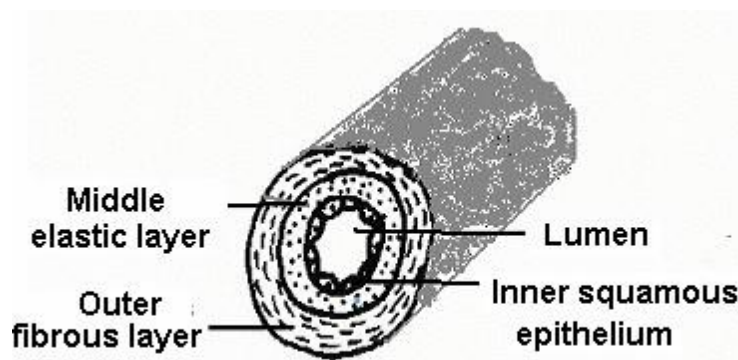
- Arteries have thick elastic walls
- Arteries have a **narrow lumen**
Lumen is the space inside a tube such as a blood vessel
- Arteries carry blood away from the heart to the parts of the body
- Arteries carry oxygenated blood except the pulmonary artery which carries deoxygenated blood from the heart to the lungs
- Blood in arteries flows under high pressure because it is pumped from the heart into the arteries at high pressure.

This high pressure can be felt in the arteries as a beat.

We can determine the number of times the heart **beats** in a minute by counting the beats in the arteries

The number of times the heart beats in a minute is called a **pulse or a beat rate**.

The pulse is easiest to find on the wrist and on the neck



To check the pulse at the wrist

Pupil's activity

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Name	Pulse at rest	Pulse after jumping
1.		
2.		
3.		
4.		
5.		

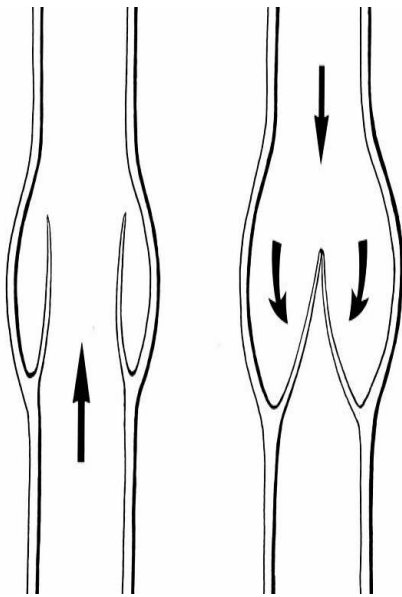
NB: the pulse increased after jumping

- The pulse rate of a healthy person at rest is between 60-100 beats per minute
- Pulse increased during an activity
- This because during activity, the body needs more oxygen and so the heart pumps blood faster to supply the body with more oxygen .

Veins

1. Veins have **thin walls**
2. Veins have a **wide lumen**
3. Veins have **valves** to ensure blood flows only in one direction

4. Veins carry blood **towards** the heart
5. Veins carry **deoxygenated blood** except the **pulmonary vein** that carries **oxygenated blood** from the lungs to the heart.



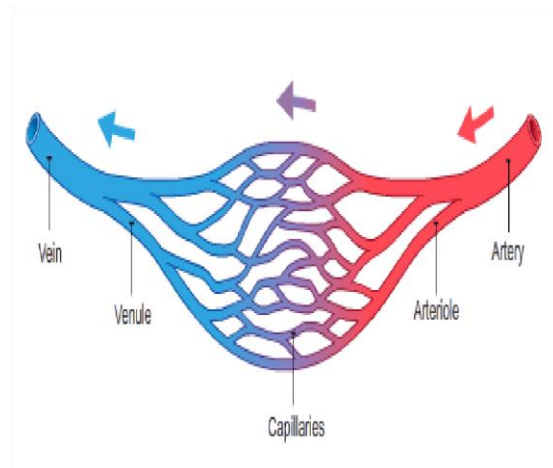
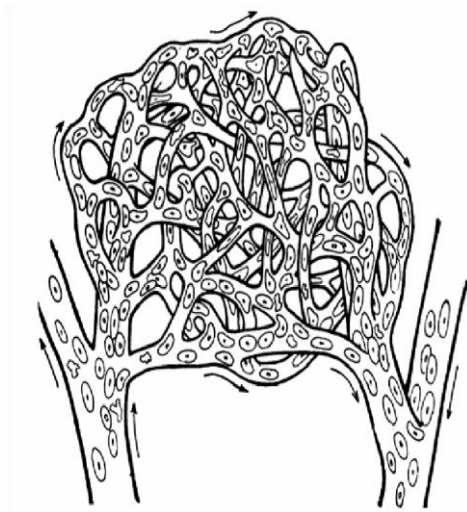
Valve A shows a vein with **open valve** to allow blood to pass through it while valve B shows a vein with **closed valve** to prevent

blood from flowing backwards

Capillaries

1. Capillaries have **very thin** walls
2. Capillaries have **no valves**
3. Capillaries reach every part of the body.

They allow movements of oxygen and food nutrients from blood into the body. They also allow the movement of carbon dioxide and other wastes from the body into the blood



Difference between arteries, veins and capillaries

Arteries	Veins	Capillaries
Have thick elastic walls,	Have thin walls and elastic,	Have thin walls
Have no valves	Have valves	Involved in the exchange of substances between blood and body organs
Carry blood away from the heart		Are very narrow,
		Form network in every organ and tissue

Components of blood and their functions

To find out the components of blood

Pupil's activity

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To study the components of blood

Pupil's activity

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BLOOD COMPONENTS AND THEIR FUNCTIONS

The four main components of blood are:

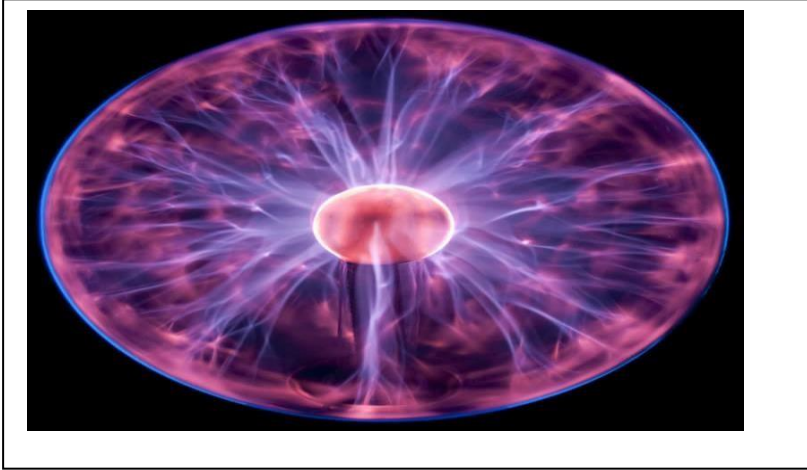
1. Plasma
2. Red blood cells
3. White blood cells
4. Platelets

1. Plasma

It is the liquid part that forms the main part of the blood

It is mostly pale yellow.

It contains dissolved substances e.g. digested food, salts, amino acids and glucose.



Functions Plasma

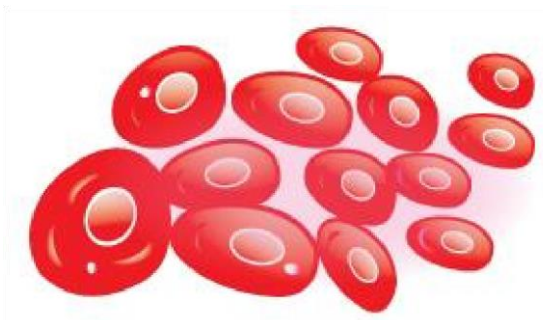
Transportation of:

- a) Digested food from the ileum to all parts of the body.
- b) Oxygen from the lungs to all body tissues.
- c) Carbon dioxide from body cells to the lungs to be expelled.
- d) Waste products to the organs of excretion.
- e) Heat from the liver to all parts of the body.
- f) Hormones from the glands to where they are needed.
- g) Other blood components e.g. white blood cells, red blood cells and platelets to where they are needed

Red blood cells -

Biconcave in shape.

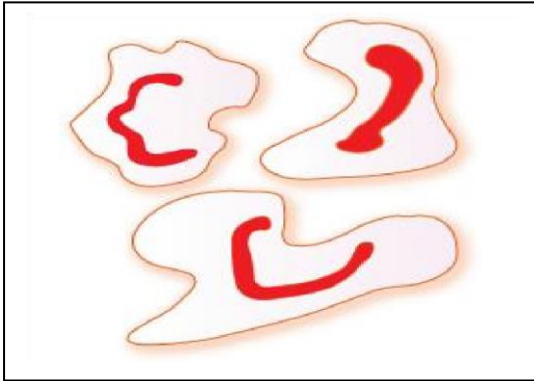
- Contain haemoglobin (Red colouring matter).
- Have nucleus which disappears on maturity.
- Produced in red bone marrow
- Destroyed (broken) in the liver/spleen.
- Red blood cells carry oxygen from the lungs to the body tissues.
- Oxygen combines with haemoglobin to form oxyhaemoglobin –oxygenated blood, which is bright red in colour (dark red)



White blood cells

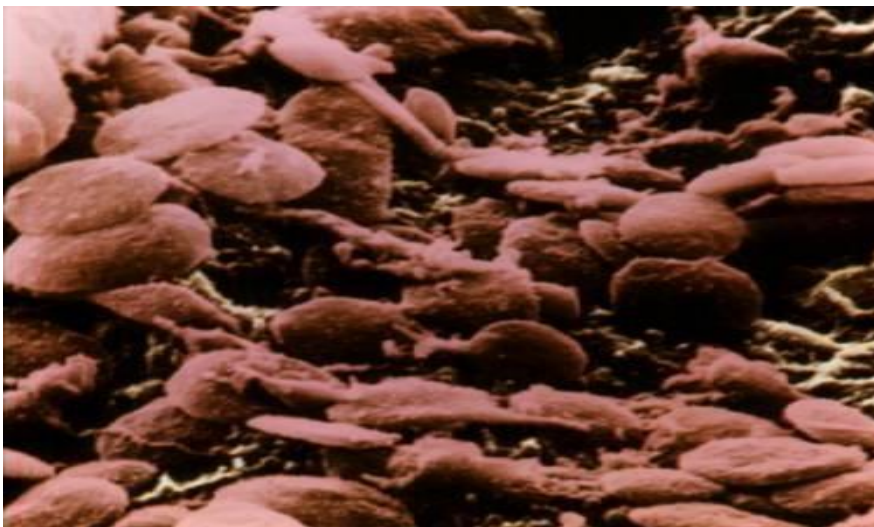
- Larger than red blood cells
- Few in number compared to red blood cells i.e. ratio of white to red blood cells is 1:600

- Have no definite shape- they change their shape easily - Have a nucleus at the centre
- Produced in the yellow bone marrow and the lymph glands **N.B. *White blood cells fight and kill germs by engulfing them.***



d) Platelets

- They are tiny oval shaped cells
- They are found in plasma
- Help the blood to clot when injured.
- They prevent further loss of the blood from the part that was injured. They help to stop bleeding from cuts and wounds.



Blood groups

- **Blood group** is the type of blood a person has.
- The **ABO blood group** system is one of the ways of grouping blood.
- In the ABO blood group system, there are 4 main blood groups
- These are
 - A. Blood group A
 - B. Blood group B
 - C. Blood group AB
 - D. Blood group O

Blood transfusion

- It is the process by which blood from one person is added to another person ➤ The person who gives blood is called **donor**.
- The person who receives blood is known as **recipient**.
- Blood transfusion is done to help restore blood in people who have lost a lot of blood due to injuries or disease
- Before a blood transfusion is done it is important to know the blood group of both donor and the recipient.
- This is to ensure that compatible, that is it can mix without the red blood cells clumping together (agglutination) in the recipient's body.
- Clumping together of red blood cells can be dangerous

Compatibility of blood groups

	CAN DONATE TO	CAN RECEIVE FROM
Blood group A	Blood group A and AB	Blood group A and blood group O
Blood group B	Blood group B and blood group AB	Blood group B and Blood group O
Blood group AB	Blood group AB	All groups
Blood group O	All groups	Blood group o

- A person with blood group O can donate blood to people of all the other blood groups. People with blood group O are referred to as **universal donor**
- A person with blood group AB can receive blood from all the blood groups and is therefore referred to as **universal recipient**.

To make models of different components of blood

Pupil's activity

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REPRODUCTIVE SYSTEMS

Living things have organs that enable them to reproduce.

These organs form the reproductive system

This part presents two kinds of reproductive system, namely female and male reproductive systems.

Parts and functions of the female reproductive system

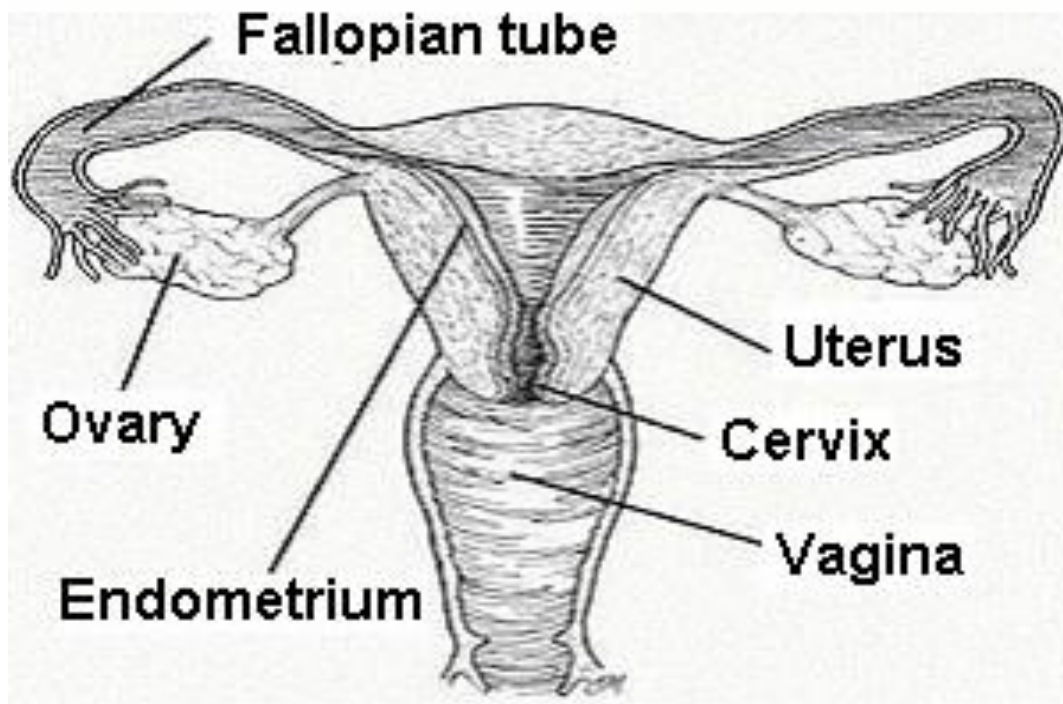
To discuss the parts and functions of the female productive system

Pupil's activity

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The system by which human beings are enabled to produce young ones is called female **reproductive system**. The system consists of different parts. These include:

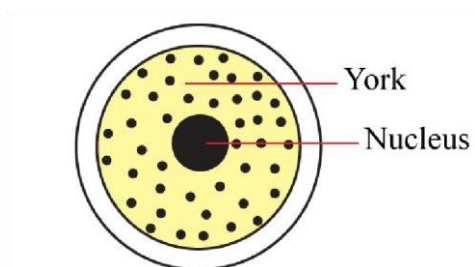
1. Vagina
2. Cervix
3. Uterus
4. Ovaries and 5. Fallopian tubes.



Definition and functions of the major parts of the female reproductive system

1. Ovary

- They are small oval shaped glands that are located on either side of the uterus
- They **produce egg cells** called **ova** in a process called **ovulation**. When released the eggs enter into the oviduct



- They produce hormones

2. Oviduct

- Also called fallopian tube
- The oviduct is a tube that connects the ovary to the uterus
- It is the place where fertilisation of the egg by the sperm takes place

3. Uterus

- Also known as womb
- The place where the fertilized egg develops into a foetus

4. Cervix

- It connects the vagina with the uterus
- It produces mucus that facilitates the entry of sperms
- It opens to allow passage of a baby from the uterus into the vagina during childbirth

5. Vagina

- Also known as birth canal
- It is an elastic tube that extends from the vaginal opening (vulva) to the cervix
- It receives semen during intercourse
- It is the birth canal through which the body passes during birth

Parts and function of the male reproductive system

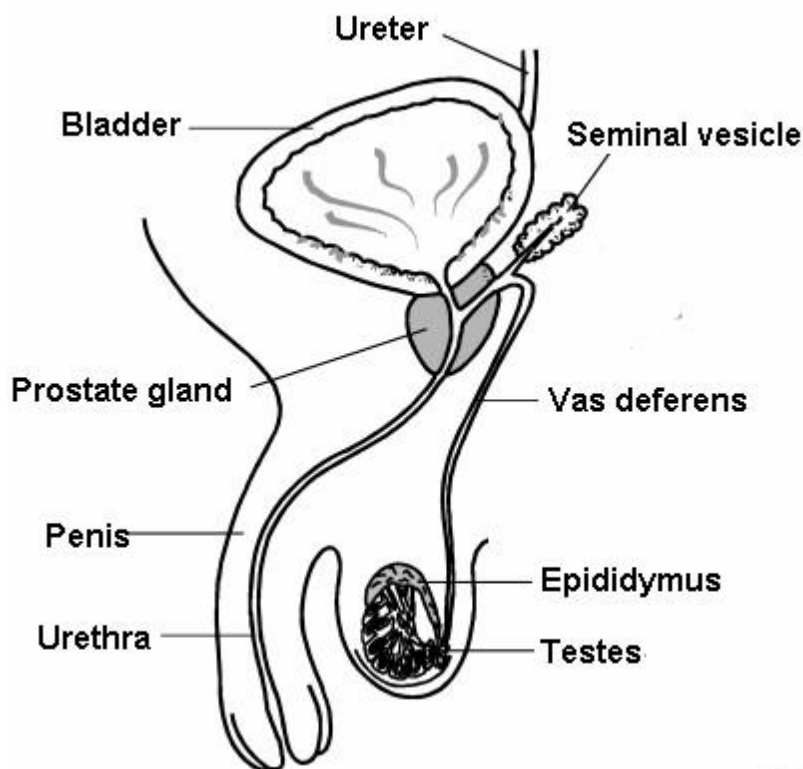
To discuss the parts and functions of the male reproductive system

Pupil's activity

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Male Reproductive System consists of various parts. These include

1. Penis
2. Testis
3. urethra,
4. Gland – Prostate gland, seminal vesicles and the Cowper's gland



Definition and functions of the major parts of the male reproductive system

1. Penis

- It is the male sex organ
- Tube like structure through which sperms are released
- It transfers sperm into the female reproductive system during intercourse
- Also in this structure urine is passed outside the body.

2. Testicle or testis/testes

- Testis is oval shaped and is enclosed within a structure called scrotum which hangs outside the body
- Testis produces sperms and hormones

3. Urethra

- The urethra is a tube that runs through the penis
- It is a passage of sperms and urine out of the body

4. Gland

- The glands produce a fluid as **seminal fluid**
- Sperm cells depend on seminal fluid to move and to keep them alive
- The mixture of **seminal fluid** and **sperm** is called **semen**

5. Sperm duct

- A tube that allows the sperm to pass from testis to the urethra

Physical changes that occur during adolescence

- The period in a persons' life when developing from a child into an adult is referred to as **adolescence**.
- The stage is usually between the age of 12 and 19 years.
- During this time many changes take place in terms of growth and physical changes.
- **Physical changes** are changes that are visible
- The boy or girl who is undergoing this change is called **adolescent**

Physical Changes in Boys during adolescence

1. Broader chest and shoulders
2. Breaking voice to become deeper
3. The penis, testes and scrotum enlarge
4. Growing of hair in part of the body (around sex organs, pubic hair, chest hair, beards on the face and armpits).
5. Sperms mature in the testis experiences ejaculation, which is release of sperms through penis. At times this can happen during the night and is called wet dreams. 6. Boys eat more because height and weight are increasing and becoming muscular
7. At times development of pimples on the face may occur.

Physical Changes in Girls during adolescence

1. Growth of breasts

2. Hair grows in the armpits and around sex organs(pubic hair)
3. Hips become broader,
4. Release an egg by ovaries after 28 days (ovulation). This happens if the egg(ovum) is not fertilized. The lining that had been formed in the uterus along with the egg breaks down and flows out of the body through vagina as blood. This process is called menstruation. It occurs once a month and may last 4-5 days,
5. Pimples may appear on the face
6. Rapid increase of weight and heights and may cause them to eat more

NB: Apart from physical changes, adolescents undergo other changes that affect their feelings and behaviour towards other people. These changes are known as emotional changes

EMOTIONAL CHANGES IN BOTH GIRLS AND BOYS

Moods: Hormones lead to mood changes that an adolescent cannot explain.

This might bring misunderstanding between the adolescent and other people. They become unreasonably aggressive, angry, easily disappointed etc.

Shyness: Girls feel shy about their enlarging breasts or pimples on their face.

Boys are shy about their cracking voice.

Embarrassment: Girls are embarrassed about their menstrual flow. Boys about their wet dreams

Unhappy: Boys and girls feel unhappy with the size and shape of their bodies.

Worry: Both tend to worry about their appearance, especially when pimples develop on the face, a condition known as Acne.

Girls who start their menstrual flow late or have small breasts tend to worry about themselves. They may feel abnormal.

Social implications of changes that occur during adolescence

1. Development of new identity

This makes adolescent try out new clothing styles, listen to new music and develop new friendships all in a bid to behave like adults

2. Development of values

This makes adolescent question things.

They therefore seem like they are rebelling against established rules

3. Desire for independence

This makes adolescents want to make their own decisions like how to spend their free time or how to spend their money

4. Increased peer influence

This influences adolescent's behaviour and mode of dressing

Adolescents want to be important and recognised by their friends

5. Development of interest in the other gender leading to relationships

6. Increased influence from media. The internet greatly influences adolescents

Health implications of changes that occur during adolescents

1. Sexually transmitted infections (STI) and diseases usually pass from one person to another through sexual contact

AIDS, Syphilis and Gonorrhoea are some of examples of sexually transmitted infections

2. Adolescents need to practise good hygiene for their well being and for those around them
3. Teenage pregnancy can increased health risks for newborns as well as for the young mothers
4. The use of alcohol and other drugs can lead to addiction, failure in school and poor judgement which may put adolescents at risk of accidents and suicide
5. Adolescents are encouraged to share their feelings when they feel overwhelmed.

ENVIRONMENT WATER CONSERVATION

MEANING OF WATER CONSERVATION

Conservation of water means the proper care and use of water and water sources. Conserving water ensures it's spared for future use.

To discuss the meaning of water conservation

Pupil's activity

Page 61

Ways of conserving water

To find out how water is conserved in the locality

Pupil's activity

Page 62

WAYS OF CONSERVING WATER

1. Harvesting rainwater
2. Recycling the use of water
3. Re-using
4. Using water sparingly
5. Mulching/shading
6. Storing water in dams/constructions of dams

7. Reducing the use of water

REUSING

- Reusing water means using water that has already been used
- Water which has already been used can be used for another purpose
- The following are some ways in which water can be reused
 1. Water used to wash clothes can be used to flush the toilet, cleaning houses
 2. Water used for cleaning fruits and vegetables can be used again for watering crops on the farm
 3. Water used for washing clothes can be sprinkled on earthen floors to reduce dust
 4. Water used for washing hands can be used to mop floors

REDUCING THE USE OF WATER

- Reducing involves using available water carefully to avoid wastage
 1. Turning off the water tap while brushing teeth.
 - Leaving the tap running while brushing teeth wastes water
 2. Using basins rather than running water when cleaning utensils.
 - Cleaning utensils in basins uses less water than cleaning them under running water
 3. Repairing broken water pipes
 - Leaks from pipes waste a lot of water
 4. Taking a short time to shower or using water in a basin to bath
 5. Using drip irrigation instead of overhead irrigation
 - In drip irrigation, water is put directly to each plant.
 - This ensures that there is no wastage of water.
 - In overhead irrigation, not all water falls on the plants. Some of it goes to waste.
 - Drip irrigation helps to conserve water

RECYCLING

- Recycling water is treating water that has already been used so that it is safe to be used again.
- Treating water ensures that polluted water is not lost but it is available for use again
- Wastewater from toilets, bathrooms and industries can be recycled in special areas known as sewage treatment plants.
- In sewage treatment plants, solids are filtered out of the wastewater.
- Chemicals are then added to the remaining water to kill germs and make it safe for use before it is released into environment.

HARVESTING RAINWATER

- Harvesting rainwater is done by trapping it from roofs of houses using gutters
 - The gutters trap rainwater and direct it to a storage tank.
- Harvesting water ensures that rain water does not go to waste
- Water harvested from roofs made of asbestos is not safe for drinking or cooking.

MULCHING

- Mulching involves covering soil around plants
- This reduces the loss of water from the soil through evaporation
- Mulching reduces evaporation of water from the soil.



CONSTRUCTION OF DAMS

- Dams are structures that are built across rivers or streams to hold water for future use.
- Dams can be constructed in areas where floods occur to store excess water or in dry areas to store water when it rains
- The water in the dams is then used for domestic purposes, irrigation or to produce electricity.

Importance of conserving water

1. To ensure constant supply of water during the dry season and when there is a shortage.
By conserving water, we ensure that there is enough water for use throughout the year.
2. To conserve our environment
Human beings are not the only living things that requires water for survival. All plants that there is enough water for other animals and plants.
3. To reduce the amount of water spent on water bills.
Using less water means paying less money on water bills.
4. To reduce pollution especially from sewage.
Treating sewage reduces the amount of harmful substances that are released into the environment
5. To conserve energy.
By conserving water, we reduce the amount of energy used to pump water.

MATTER

Matter is anything that has weight and occupies space.

Matter exists in three forms:- solids, liquids and gases

Properties of matter Expansion and contraction of solids

To demonstrate expansion and contraction of solids using a metallic ball and a ring

Pupil's activity

Page 91-92

To demonstrate expansion and contraction of solids using nails

Pupil's activity

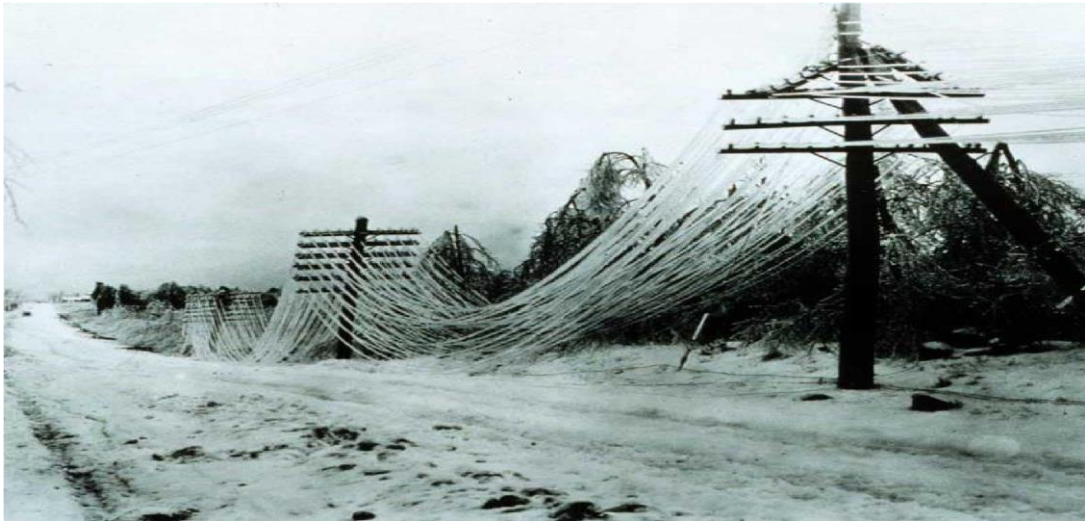
Page 92-93

Application of expansion and contraction in everyday life

1. In overhead power lines.

- Overhead power lines expand on hot days and contract when it is cold.
- To solve this problem, they are installed in such a way that they hang loosely.

- This is to give them room to expand on hot days



2. In metallic bridges

One side of a metallic bridge is fitted with rollers to allow for expansion and contraction. On hot days when the metals expand, the rollers allow the bridge to slide over smoothly. On cold days, when metals contract the rollers allow the bridge to roll back without damaging the bridge.

3. In railway tracks

On hot days railway tracks expand. To solve this problem, gaps are left between sections of railway tracks to give them room to expand.

If no gaps were left, the railway tracks would be damaged when they expand.

Removing metal caps from bottles

Putting the cap in hot water expands it thus making it loose and easy to remove

COMPOSITION OF AIR

Components of air in the atmosphere

To find out the different components of air in the atmosphere

Pupil's activity

Page 101

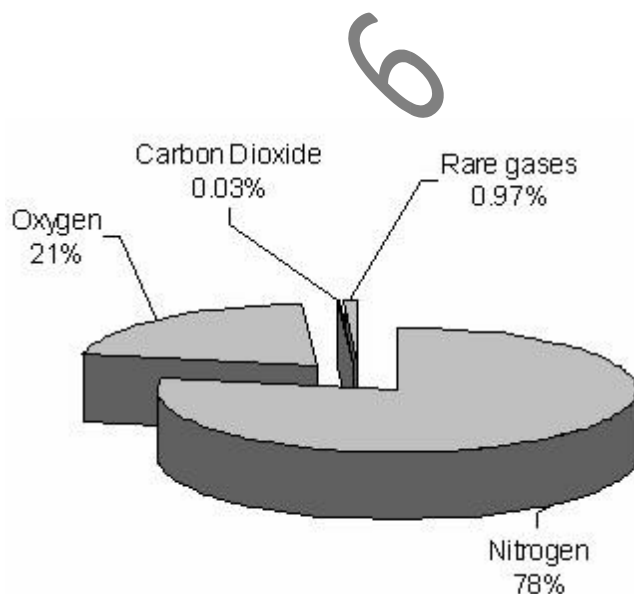
- Air is a mixture of many gases
- The components of air are
 1. Nitrogen gases
 2. Oxygen
 3. Carbon dioxide
 4. Noble gases
- Air also contains water vapour and dust

**Oxygen and nitrogen
To show that air
contains oxygen and
nitrogen**

Demonstrating that air is a mixture of gases

Pupil's activity

Page 101-103



- Oxygen (21%)
- Carbon dioxide (0.03%)
- noble gas (0.97%)

Carbon dioxide

To investigate the presence of carbon dioxide in air

Pupil's activity

Page 104

Air is made up of various gases as listed: Nitrogen (78%)

Water vapour

To show that air contains water vapour

Pupil's activity

Page 104

Uses of different components of air

To find out the uses of oxygen

Pupil's activity

Page 105-106

Uses of OXYGEN

a) Breathing

- All living things need air
- When we breathe in air, the body use oxygen present in the air
- Oxygen is needed in our bodies to combine with food to produce energy.
- Oxygen is used in hospitals to help patients with breathing difficulties
- Deep seas divers carry oxygen tanks tied to their back which help them breathe under water.

b) Burning/combustion

- Oxygen is used in burning.
- Fuels e.g. charcoal, petrol cannot burn without oxygen.
- The burning candle in the diagram below has used oxygen in the glass forcing water to rise in the glass by a fifth.



c) Germination

- Seeds need air (oxygen), water and warmth to germinate.
- Seeds in boiled water covered with an oil layer did not germinate because they lacked oxygen.
- Water is boiled to expel air.

Uses of CARBON DIOXIDE

To find out the uses of carbon dioxide

Pupil's activity

Page 106-107

a) Making food for plants./Photosynthesis

- Green plants make their own food through a process called photosynthesis.
- Photosynthesis is the process by which plants make their own food
- Sunlight, carbon dioxide, water and chlorophyll are needed during photosynthesis.

In the process of photosynthesis, plants release oxygen into the air

b) Preserving soft drinks

- It is added as a preservative during the manufacturing of soft drinks e.g. sodas
- Carbon dioxide is used to preserve soft drinks and prevent them from going bad

c) Making fire extinguishers

- Carbon dioxide and water are filled in a metallic can and used as a fire extinguisher.
- Carbon dioxide does not support burning.

When sprayed on a fire, it puts out the fire

Uses of NITROGEN

To discuss the uses of nitrogen

Pupil's activity

Page 108

Nitrogen

1. In making fertilizers

Nitrogen is used for making fertilizers. Fertilizers are applied to plants to make them grow well

2. in food preservation

Nitrogen is filled in food storage containers and bags to prevent the food from going bad

3. in bulbs

Nitrogen is used for fill inside electric bulbs

It prevents the filament in the bulb from burning

4. in plants

- Leguminous plants fix atmospheric nitrogen into the soil nitrogen using bacteria found in their root nodules.
- They use fixed nitrogen to make proteins.
- Legumes are sources of proteins e.g. peas, beans, groundnuts, Lucerne, desmodium

Uses of noble gases

To discuss uses of noble gases

Pupil's activity

Page 109

1. in advertising lights

Noble gases are filled in fluorescent bulbs to make them glow

2. in balloons

Some noble gases such as helium is filled in weather balloons and decorative because it is light

3. in welding

Noble gases such as argon are used to melt metals in welding

Safety while working with heat

To discuss safety when working with heat

Pupil's activity

Page 109-110

1. never play with matches as this might Cause a fire
2. after you light a match, put it out before disposing of it properly
3. always put out the fire after carrying out any activity involving fire
4. do not touch hot apparatus with bare hands to avoid getting burns. Always use gloves

FORCE AND ENERGY

Force Friction Meaning of friction

To find out the meaning of friction

Pupil's activity

Page 111

- Friction is a force that opposes the movement of objects that are moving, sliding or rubbing or rubbing over each other
- Friction works the direction opposite to the direction in which an object is moving
 - Friction always slows down or stops a moving object

To demonstrate friction

Pupil's activity

Page 112

Advantages and disadvantages of friction

Advantages of friction

To find out the advantage of friction

Pupil's activity

Page 112-113

Advantages

- Movement of vehicles

- Walking: if no friction between our soles and the floor, walking would not be possible
- Sharpening tools
- Lighting matches

Causes a match to light: heat generated by the match head and the match box helps light the matchstick. The early man made fire by rubbing two dry pieces of wood together.

- Riding bicycles

Operation on brakes depends on friction.

- Erasing work
- Skating
- Writing and drawing
- Friction between tyre of a car and road makes the car to move

Disadvantages of friction

To discuss the disadvantages of friction

Pupil's activity

Page 116

Disadvantages

- Hinders work
- Cause tear and wear
- Friction causes heat in car engines which if too much may lead the parts to seize up.

Increasing and reducing friction

Ways of reducing friction

To find out the different ways of reducing friction

Pupil's activity

Page 118-121

Ways of Reducing Friction

Friction can be reduced through the following ways:

- Rubbing surfaces to make the smooth
- Oiling/greasing places between the surfaces
- Using rollers and ball bearing to reduce friction
- Streamlining

Ways of increasing friction

To discuss ways of increasing friction

Pupil's activity

Page 122-123

Increasing the roughness of surface in contact increases friction

Friction can also be increased the forces between two surfaces that are in contact

1. Applying force on a sandpaper to smoothen wood
2. Pressing a matchstick harder on the matchbox to light it

3. Applying force on a brush when scrubbing dirty surfaces

Uses of friction in everyday life

Pupil's activity

Page 123-125

Effects of friction

Pupil's activity

Page 125

- Makes an object to start moving
- Stops a moving object
- Change direction of a moving object ➤ Speeds up a moving object ➤ Change the shape of an object.

LIGHT ENERGY Meaning of reflection of light

Pupil's activity

Page 126

- When rays of light fall on a shiny surface like a flat mirror, they bounce off.
- We say the light has been reflected.
- Mirrors reflected light in a special way that enables us to see images in them

Reflection is the bouncing back of light when Materials that reflect light are called reflectors. Reflection happens when light hits a smooth shinny surface.

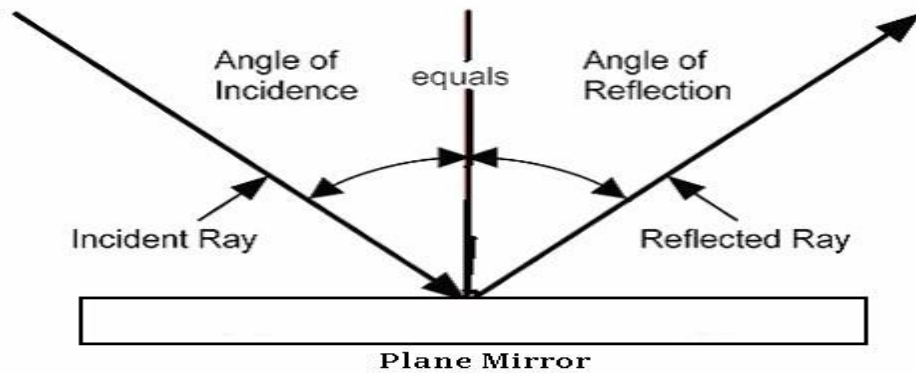
Reflection of light by different materials

To demonstrate reflection of light by different materials

Pupil's activity

Page 126-128

1. The mirror reflects light which is seen as a patch on the wall. The ray of light from the light source is known as the **incident ray** while the reflected ray is known as **reflected ray**



2. Objects with smooth surface reflect light in one direction. This called regular reflection. Object with uneven surface reflect light in different directions. This is called irregular or diffuse reflection.

Application of reflection of light in day to day life

To find how reflection of light is used everyday

Pupil's activity

Page 129

1. Seeing object

- Reflection enables us to see.
- We see objects like a light bulb or a lit candle because they give off their light.
- We also see other objects because they reflect light.
- Light moves in a straight line from a source and when it hits an object, it is reflected into our eyes allowing us to see the object
- When reading light from a source hits the book and some of this light is reflected into the eyes
- This enables person to see the book

2. Reflector clothing

- These clothes are made with materials that reflect light

- When light shines on them, they reflect light and are seen from far
- This makes the wearer visible
- Reflector clothing helps to prevent accidents
- People who wear reflector clothing include
 1. Road Construction workers
 2. Policemen
 3. Medical rescue teams
 4. Fire brigade
 5. Cyclists
- Reflector helps the wearer stay safe

3. In mirrors

Mirrors reflect light in a special way that allows a person to see images in them.

Mirrors are used in many places

- a. In vehicles- vehicles are fitted with side mirrors to help drivers to see what is behind the vehicle
This helps to prevent accidents on roads
- b. By dentist- dentist use dental to examine teeth in the mouth
- c. We use mirrors to see our image when doing activities such as combing hair

NB Convex mirror

A mirror that curves outwards is a convex mirror

Side mirror in vehicles are made of convex mirrors

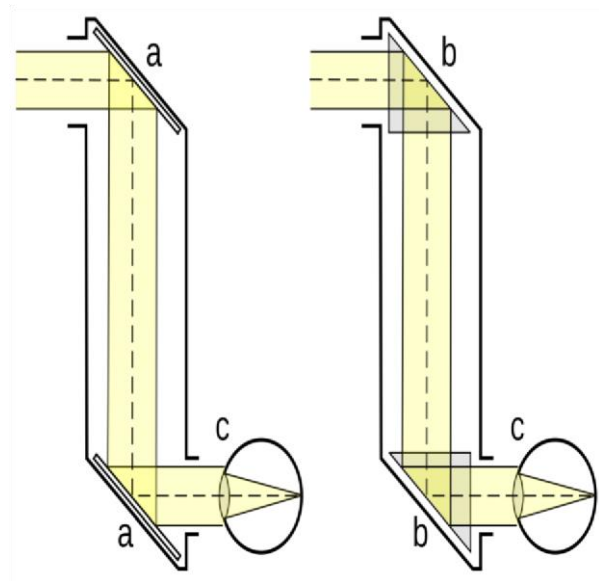
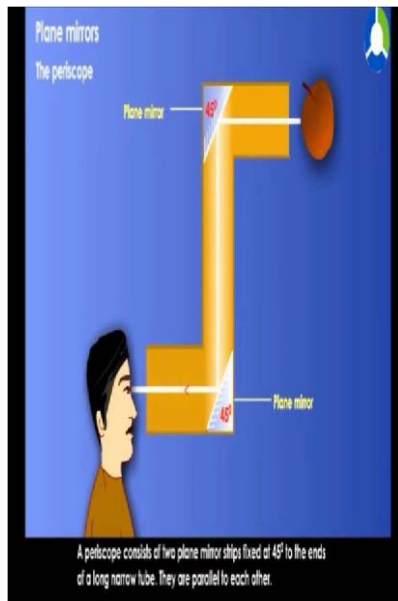
They let the driver see a wider area

Concave mirror

A mirror that curves inwards is a concave mirror

The headlights of vehicles and torches have concave mirrors to direct rays of light outwards over a large area

4. In periscopes



A periscope is an apparatus is used to see places that are out of sight such as over walls, fences or around corners

Periscopes are also used in submarines.

Submarines are ships that move underwater

People in submarines use a periscope to see what is above water

5. In vehicles
6. In road construction

Making a periscope

Pupil's activity

Page 132

MACHINES Slopes

Meaning of slopes

To discuss slopes

Pupil's activity

Page 134-135

- A slope is a flat surface with one side positioned higher than the other.
- Slopes are used to raise objects to higher ground using less effort
- Slopes are simple machines because they make work easier and quicker
- Slopes can also be used to lower objects from higher position to the ground with ease

How slopes make work easier in life

To demonstrate how slope make work easier

Pupil's activity

Page 135

Forms of slopes

To discuss forms of slopes

Pupil's activity

Page 136 137

1. Ladders

Ladders are used to climb tall structures.

Climbing a tall structure is easier than climbing without

Ladders are placed leaning against a wall or any other structure that needs to be climbed and the person using it climbs up by stepping on the horizontal bars known as **rungs**

2. Staircase

Staircases help a person to climb up to a higher level or another floor in a building They are made of fixed steps that make walking up easier

3. Ramps

Ramps are flat with one end higher the other.

They are used for moving loads to higher grounds.

This is done by pushing the load along the ramps

Most buildings have ramps at their entrances

These ramps allow physically challenged people like those using wheelchairs to access those buildings in a comfortable and safe way

Uses of slopes in everyday life

To identify areas where slopes have been used to make work easier in the locality

Pupil's activity

Page 137-138

Construction of a simple slope

Pupil's activity

Page 138-139