PlusOne

SCIENCE AND TECHNOLOGY

Updated Curriculum

GRADE 7

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Learner's Book

PlusOne

Science and Technology

Grade 7

Learner's Book

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SECONDARY BOOK PRESS
Anchors of the schools curricula

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Unit

1

HUMAN BODY

Unit Objectives

At the end of this unit, you should be able to:

(a) describe the main parts and the structure of the respiratory system.
(b) explain the functions of the components of the respiratory system.
(c) demonstrate the breathing system through manipulating models.

Looking Back

When you were in grade 6, you studied the human reproductive system. The male reproductive system organs are made up of the penis, testes, scrotum and other parts. The testes produces sperms while the scrotum covers and protects the testis from physical damage. The female reproductive system organs are made up of the vagina, uterus, cervix, fallopian tube and ovaries. The ovary produces an egg at monthly interval. Try to remember some of the functions of the other parts of the human reproductive system. In this unit, you are going to study the respiratory system of a human being.

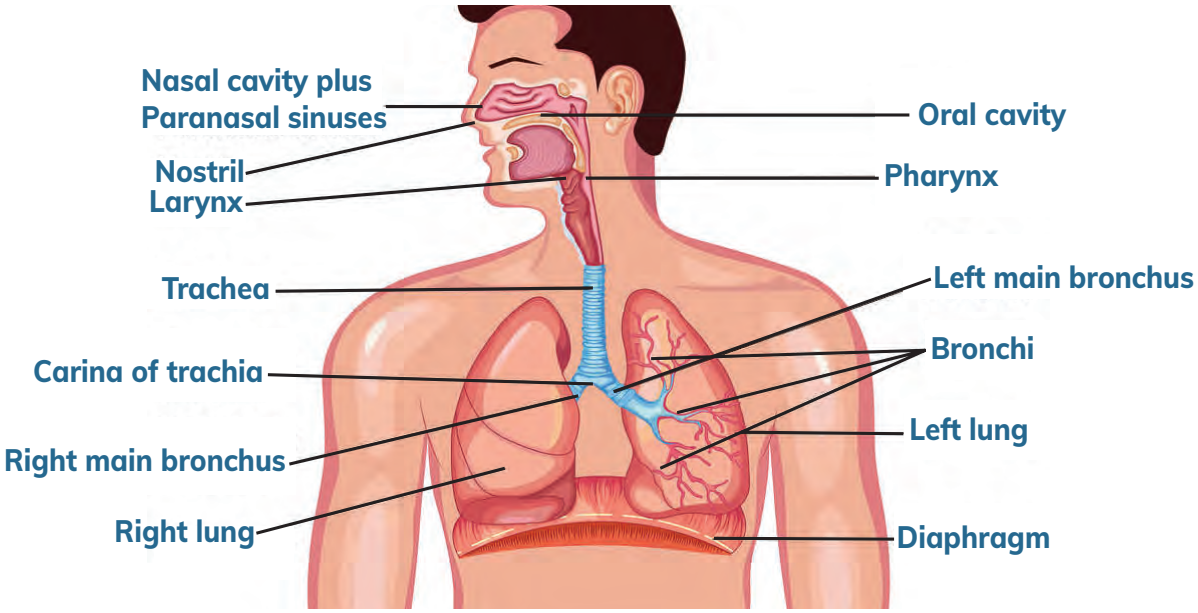
Key Words

Respiration – is the breakdown of glucose in the body so that energy is released.
Gaseous exchange – is the inter-change of gases that is intake of oxygen and release of carbon dioxide.
Diffusion – is the movement of molecules from down a concentration gradient.

Human respiratory system

The human respiratory system is a series of organs responsible for taking in oxygen and expelling carbon dioxide. The respiratory system's main functions are for gaseous exchange in which oxygen needed for breaking glucose is brought into the body and carbon dioxide is released from the human body.

Exchange of gases, that is, oxygen and carbon dioxide takes place in the lungs. The respiratory system makes the human body to get oxygen.



Human respiratory system

The respiratory system is made up of the following parts:

- Nose.
- Mouth.
- Trachea.
- Bronchus/two bronchi.
- Lungs.
- Diaphragm.
- Rib cage.

Functions of the parts of the respiratory system

1. Nasal passage/nose

- The nose is the first opening for passage of air into the body. Air which enters into the body is made to be warm to body temperature, moistened and filtered to remove dust particles and some impurities like bacteria in the nose. The dust particles and bacteria will stick to the mucus in the nose.
- Hair in the nose helps to trap dust particles and prevent dust from getting into the body.
- The nose is also the organ that is responsible for the sense of smell.
- Nasal passages from the nose lead into the trachea.

2. Mouth

The mouth is the entrance of air into the body. The mouth connects to the wind pipe.

3. Trachea/wind pipe

- The trachea is a passage which joins up from nasal passage and the back of the mouth which leads to lungs.

- The trachea is surrounded and supported with cartilage rings so that the trachea is kept open always.
- Inside the trachea, there are moist membranes and very small hairs which are known as cilia which help to remove dust particles and some impurities like bacteria.
- The trachea warms the inhaled air (oxygen)- air that is breathed in, in the same manner in which the nasal passage warms air breathed in.
- The cilia (microscopic/very small hairs) in the trachea can be destroyed with smoke from cigarettes when a person smokes tobacco cigarette.
- The trachea or wind pipe divides into the right and left bronchi (bronchus-one) of each lung.

4. Bronchi (Bronchus-for one)

The two bronchi start at the bottom of the trachea when the trachea divides into two-the right bronchus and the left bronchus which enter into lobes of the lung. Bronchioles and the bronchi are air tubes and do not facilitate exchange of gases. Gaseous exchange occurs between the airsacs and the capillaries.

- The right bronchus is wider and shorter tube than the left bronchus which is longer and narrower.
- The bronchi is also supported and strengthened with cartilage rings.
- Each bronchus gets into each lung and divides into many smaller branches when it gets into the lungs.
- The small divisions of the bronchus inside the lungs are called bronchioles.
- The bronchioles sub-divides into many small branches to form alveolar ducts of which the alveolar ducts form very small (minute) air sac structures which are known as alveoli.
- There are millions of alveolar (air sacs) in each lung where oxygen diffuses into the blood.
- The bronchioles are also supported with small plate-like cartilages to keep them open always.
- The bronchioles membranes also have cilia (hair) and mucus producing cells.
- The function of the bronchi and bronchioles is to allow exchange of gases does not occu in the bronchiloles.
- Breathing increases supply of oxygen in alveoli to that higher than oxygen in blood.
- When bronchi and bronchioles become infected with bacteria or become blocked that leads to diseases like tuberculosis and pneumonia.

5. Lungs

There are two lungs in the human body. Each lung is located in the midline in the thoracic cavity.

- The lungs have a cone shape.
- Lungs are large spongy-like sacs which are enclosed in the rib cage in the chest.
- Lung tissues are like elastic and pink in colour.

- The function of lungs is for breathing where oxygen is pulled into the lungs through nasal passage into the trachea, bronchi and into lungs.
- The lungs are supplied with de-oxygenated blood from the heart through the left and right pulmonary arteries.
- Left and right pulmonary veins carry oxygenated blood into left atrium of the heart and is pumped to the whole human body.

6. Diaphragm

- The diaphragm is a muscle which lies at the bottom of the rib cage.
- It is the floor of the respiratory cavity and it also acts as the roof of the abdominal cavity.
- The function of the diaphragm is to protect the lungs and the heart.
- The diaphragm contracts to lift the ribs upward and outwards.
- This increases the size of the chest and allows air to move into the lungs and fill lungs with air.
- During breathing out, the muscles on the ribs are relaxed and diaphragm moves back up and the ribs move downwards.
- The space inside the chest becomes less, while pressure increases forcing the air out.

7. Rib cage

It is a bony enclosing wall of the chest consisting mainly of the ribs and the structures connecting them The rib cage encloses the lungs and protects the lungs from physical harm or injury.

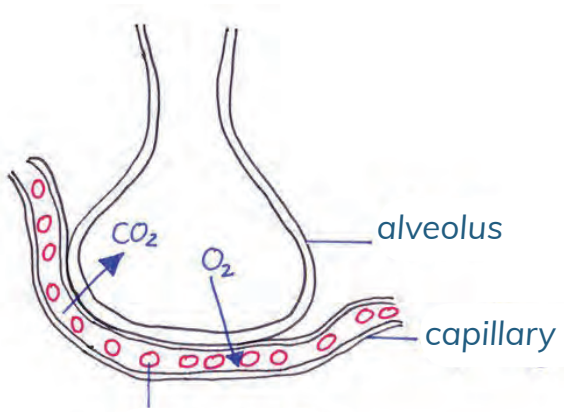
Gaseous exchange in alveolus in lungs

The gases which are exchanged in the alveolus in the lungs are oxygen and carbon dioxide.

Oxygen which is obtained from the air is breathed in (inhaled) and carbon dioxide released inside body is released out (exhaled) from the body.

Oxygen which is breathed in, is always used in the body cells to break down glucose so that energy is obtained.

This process whereby glucose is broken down in the body is called respiration.



Gaseous exchange by diffusion

After the breakdown of glucose during respiration, carbon dioxide is produced and must be moved out of the body. Breathing-in process allows oxygen to get into alveoli and increase oxygen concentration higher than in the blood.

Oxygen will always diffuse into the blood down a concentration gradient into the capillaries and alveoli (air sacs).

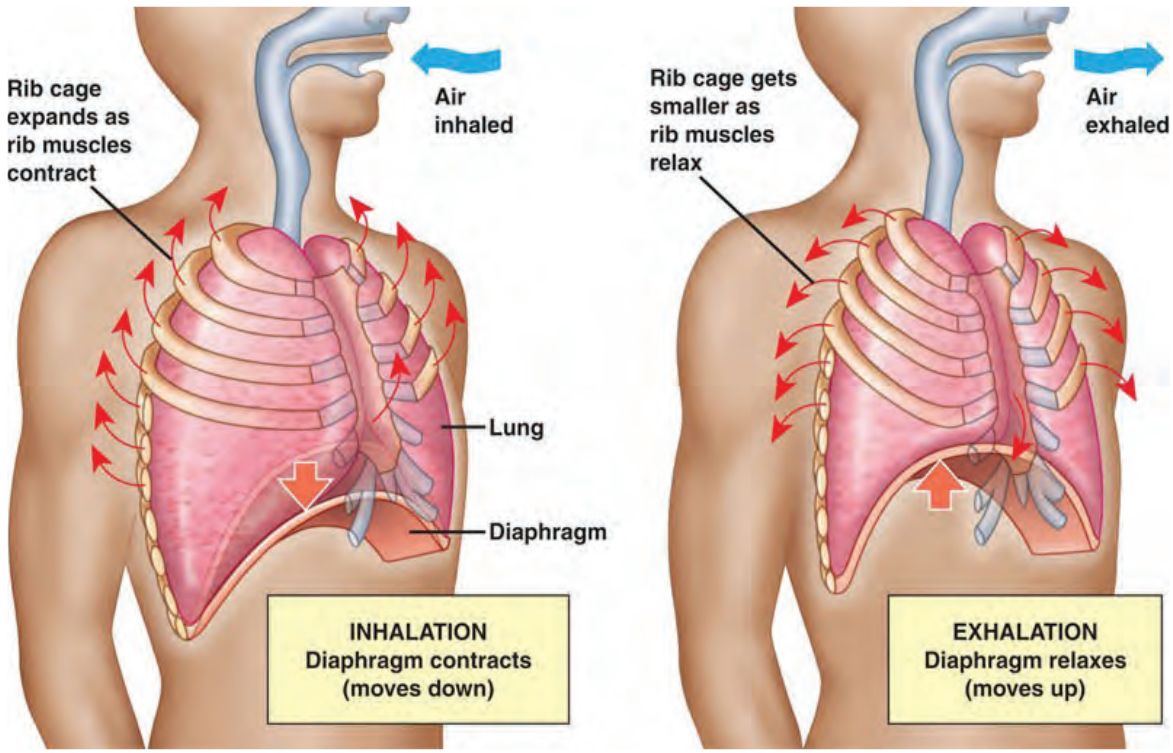
Carbon dioxide will diffuse into the alveoli from the blood in the opposite direction with oxygen and goes out of the body through breathing out.

Blood from body flowing to alveolus in capillaries have low oxygen and high carbon dioxide concentration because oxygen was used during respiration.

Blood going to the body in capillaries have more oxygen and less carbon dioxide because carbon dioxide will have diffused in through capillaries in alveoli. Air is drawn into lungs by contraction of muscles between ribs and the diaphragm muscle.

When the muscles relax, the air which contain carbon dioxide is breathed out. The heart is the one which pumps the blood through the lungs so that the blood picks the oxygen in lungs and is carried to the body cells. At the same time blood getting into the lungs from the body cells carries carbon dioxide into air sac or alveoli. The carbon dioxide is exhaled out of the body.

Breathing mechanism



The process of breathing in and out

Breathing is a process of taking in oxygen (inhalation) and removing out of the body of carbon dioxide (exhalation). The breathing process starts with air getting into the lungs through nasal passages and the mouth, into the trachea or wind pipe then into bronchi and bronchioles in lungs.

Breathing process is controlled with two types of muscles, that, is diaphragm muscle and the muscles between the ribs.

The diaphragm at the bottom of the rib cage in the chest contracts and flattens when breathing in. The muscles between the ribs contracts to lift the ribs upwards and move ribs outwards thus increase the size of the chest space thereby causing air to move into lungs.

During breathing out, the muscles of the ribs relax, the diaphragm moves upwards and the ribs move down. This reduces the space in the chest to force air out.

The movement of the muscles of diaphragm and muscles between ribs occurs automatically because it is controlled in the brain, in the medulla oblongata. The amount of air getting into the lungs and the amount of blood flowing past the alveoli and absorbing oxygen varies based on what is being done.

Differences between inhaled air (inspired air, breathed in air) and exhaled air (expired air or breathed out air).

Item	**Inhaled air(breathed in)**	**Exhaled air (breathed out air)**
Oxygen	21% Contains more oxygen	16% Contains less oxygen
Carbon dioxide	0,03% Contains less carbon dioxide	4% Contains more carbon dioxide
Nitrogen	79%	79%
Water vapour	Varies	Saturated
Temperature	Is lower than body temperature	Is at body temperature
Dust particles	Has some dust particles	Contains no dust particles

A model showing the breathing system

The breathing system which takes place in the human body can be shown by using the following method amongst others.

Materials

To make a model of the breathing system you will need the following materials;

- A plastic bottle.
- A straw.
- An elastic band.
- Scissors.
- 2 balloons.
- Play dough.

Model of a breathing system

Procedure

1. Carefully cut your bottle to about half the size.
2. Tie a knot in one end of one balloon and cut off the fat end.
3. Stretch the balloon around the bottom of your plastic bottle.

4. Put a straw in the neck of the other balloon and secure tightly with the elastic band but not so much that you crush the straw. The air must flow through, so test it with a little blow through the straw to see if the balloon inflates.
5. Put the straw and the balloon into the neck of the bottle and secure with the play dough to make a seal around the bottle – make sure that again, you do not crush the straw.
6. Hold the bottle and pull the knot of the balloon at the bottom. What happens?
7. You should find that the balloon inside the bottle inflates, and as you let go the balloon deflates.

Activity 1

1. *Make a functional model of a breathing system which takes place in the human body. Use materials which are locally available in your community.*
2. *Demonstrate to your teacher how the model works to show the breathing system.*

Exercise 1

1. Which gas is taken in during breathing in process?
2. Name five parts which make up the respiratory system.
3. State two uses of the nasal passages in the respiratory system.
4. What is the use of hairs or cilia found in the trachea?
5. What is the percentage of carbon dioxide in exhaled air?
6. The process whereby carbon dioxide exchange from capillaries into the alveoli and oxygen from alveoli into the blood capillaries is known as _____.
7. What is the function of the diaphragm?

Key points in this unit

- Air enters into the body's lungs through the nasal passage.
- The respiratory system is made up of the nose, mouth, trachea, bronchi, lungs diaphragm and rib cage.
- Lungs contain air sacs which are known as alveoli that have many capillaries around them.
- Gaseous exchange in the lungs takes place in the alveoli.
- Air enters into the human body through the mouth and nasal passage into the lungs.
- The trachea and bronchi are supported and made stronger with cartilages to keep them open.
- Oxygen and carbon dioxide diffuse from alveoli to capillaries and from capillaries to alveoli.
- Microscopic cilia (hairs) can be destroyed with smoking tobacco cigarettes.
- The amount of air getting into the lungs varies from time to time depending on what a person is doing.

Unit Revision Exercises

Multiple Choice Questions

1. The function of the respiratory system is _____.
   A. transportation of blood **B.** gaseous exchange
   C. clotting of blood **D.** reproduction
2. In which of the structures does gaseous exchange occur?
   A. Rib cage. **B.** Bronchi. **C.** Trachea. **D.** Alveoli.
3. What is the approximate percentage of oxygen in expired air (breath out) air?
   A. 0,04% **B.** 4,0% **C.** 16,0% **D.** 20,0%
4. Gas exchange in the body takes place in the _____.
   A. lungs **B.** mouth **C.** trachea **D.** heart
5. Which gas is produced during respiration in human body cells?
   A. Nitrogen. **B.** Oxygen. **C.** Carbon dioxide. **D.** Smoke.
6. Which of the following is not part of the respiratory system?
   A. Nasal passage. **B.** Trachea. **C.** Liver. **D.** Lungs.
7. How many lungs are in the human body?
   A. 4 **B.** 3 **C.** 2 **D.** 1
8. Hairs in the nose helps to remove _____.
   A. water particles **B.** dust particles **C.** humidity **D.** mucus
9. When bronchi become infected with some bacteria or become blocked, a person is likely to suffer from _____.
   A. tuberculosis and pneumonia **B.** malaria and measles
   C. typhoid and anthrax **D.** rabies and flu
10. Which air is breathed in by a person?
    A. Carbon dioxide **B.** Nitrogen **C.** Oxygen **D.** Hydrogen

Structured Questions

1. Name four parts which makes the respiratory system.
2. What is the use of the nose on the respiratory system?
3. How does gaseous exchange occur in lungs?
4. What is inhalation?
5. Which air is breathed out?
6. Where does de-oxygenated blood come from which enters into the lungs?

Unit

2

CIRCULATORY SYSTEM

Unit Objectives

At the end of this unit, you should be able to:

(a) describe the state components of the circulatory system.
(b) explain the functions of the components of the circulatory system.

Key Words

Circulatory system	– is a body system which transports blood and other substances within the body.
Plasma	– is the watery liquid part of the blood.
Oxygenated blood	– is blood carrying oxygen going to the heart so that it is circulated in the body.
Deoxygenated blood	– is blood which does not have oxygen coming from the body parts going to the lungs.
Phagocytosis	– is a process whereby white blood cells encircle bacteria and destroy it.

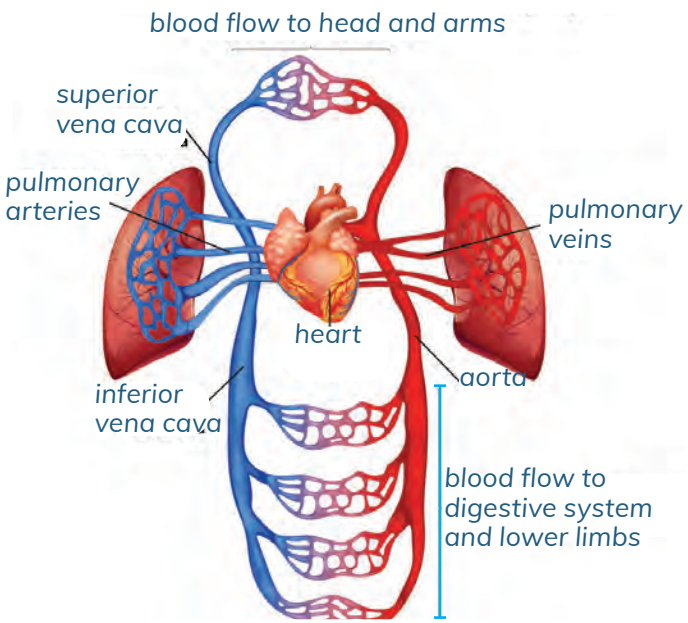
Circulatory system

The circulatory system of human body is the way in which blood flows around in the body.

The circulatory system is also known as the blood system or the transport system. It is comprised of the heart, blood vessels and the blood.

The circulatory system carries amino acids (end products of protein digestion), glucose (end products of carbohydrates digestion) and oxygen to all body cells.

It also carries waste products from the body namely carbon dioxide and urea.



Blood circulatory system in humans

- Hormones from hormone producing glands to the liver.
- Heat from heat producing organs (liver and muscles) to all body parts.

2. Homeostasis

- It is to maintain a constant internal environment of the body of water, blood, salts, hormones and warmth.
- Temperature regulation – maintains a constant body temperature. This maintenance is known as homeostasis.
- Blood distributes heat throughout the body.

Defence

- It is the ability of the body to defend itself against infection or disease attack. White blood cells in the blood attack and destroy foreign micro-organisms which cause diseases by engulfing the pathogens (bacteria, virus or protozoa). This is known as phagocytosis. White blood cells will surround the bacteria and destroy it.
- Human Immuno Deficiency Virus (HIV) which causes AIDS attack destroys the white blood cells thus the body will not be able to defend itself against other disease-causing micro-organisms.
- Blood carries platelets to site of wounds or cuts for blood clotting to stop bleeding.

Substances transported in the blood and uses of the substances

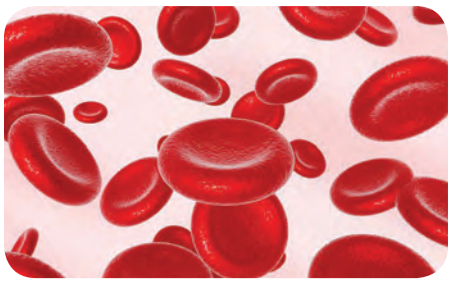
Substance	Site carried from	Site carried to	Uses/description
Oxygen.	Lungs.	• Cells of the body.	• Used for respiration. • It is carried as oxyhaemoglobin in red blood cells.
Carbon dioxide.	Body cells.	• Lungs	• No use in the body. • Carbon dioxide is produced during respiration.
End products of digestion-glucose, amino acids.	Small intestines (ileum).	• Liver and all body cells.	• Glucose is broken down during respiration. • Amino acids are used for repair of worn out tissue. • Excess amino acids are not stored in the body. They are destroyed.
Heat.	Muscles and glands.	• All body parts and skin.	• Heat is released into the atmosphere or generated when shivering.

Waste products urea and ammonia.	Liver.	• Kidneys.	• Urea and ammonia are removed through excretion in urine. • Urea and ammonia are produced by cell reactions.
Salts.	Alimentary canal/ digestive system	• All body cells • Sweat glands. • kidneys	• Helps maintain osmotic pressure/homeostasis. • Are removed during sweating.
Hormones.	Endocrine glands	• To all target organs in very small quantities.	• Regulation of growth and some body processes such as ovulation and body shape.

Components of blood and their uses

Red cells

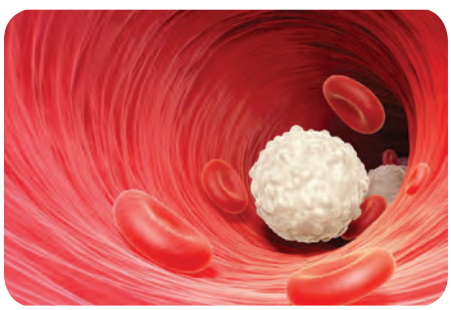
- Do not have a nucleus.
- Red cells have haemoglobin.
- The function of red cells is to carry oxygen from capillaries in the lungs to the cells of the body.
- Red cells release oxygen which they carry to all body cells.



Red blood cells

White cells

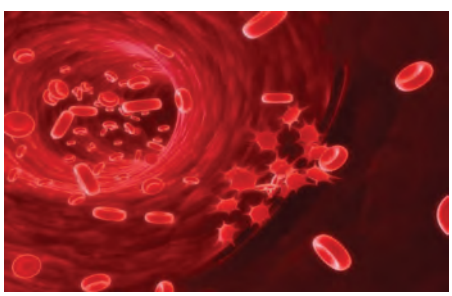
- White blood cells have a nucleus.
- White blood cells are able to change their shape.
- White blood cells protect the body against disease by destroying bacteria by engulfing them.
- Some white blood cells produce antibodies which kill bacteria or neutralize the toxins or poisons produced by bacteria.



White blood cells

Platelets

- Platelets have no nucleus.
- The function of platelets is to cause blood to clot when there are wounds.



Platelets

Plasma

- It is the watery liquid part of the blood.
- The function of plasma is to transport carbon dioxide, glucose, urea, salts and hormones to target organs.

Unit Revision Exercises

Multiple Choice Questions

1. Which blood component is responsible for defence against bacterial infection?
   A. Plasma. **B.** Platelets. **C.** Red blood cells. **D.** White blood cells.
2. What is the function of the red blood cells?
   A. To produce antibodies to destroy bacteria.
   B. To transport oxygen to cells.
   C. To make blood clot at wounds.
   D. To carry urea to the kidneys.
3. Identify a component of blood which makes blood to clot.
   A. Plasma. **B.** Platelets. **C.** Red blood cells. **D.** White blood cells.
4. How many chambers does a heart have?
   A. 2 **B.** 3 **C.** 4 **D.** 5
5. What is the purpose of valves in the heart?
   A. To make blood to flow very fast.
   B. To stop blood from flowing back into the heart.
   C. To make the heart stronger.
   D. To separate water and blood.
6. The maintenance of the internal environment at constant level is called _____.
   A. pH **B.** blood pressure **C.** homeostasis **D.** immunity
7. In which organ are waste products like urea and ammonia removed from the body?
   A. Kidney **B.** Head **C.** Lungs. **D.** Mouth.
8. Which vessels carry blood to all body cells?
   A. Veins **B.** Capillaries **C.** Arteries **D.** Immunity
9. The pH of blood is_____.
   A. 10% **B.** 9% **C.** 7,4% **D.** 5%
10. Oxygenated blood is blood which contains _____.
    A. carbon dioxide **B.** nitrogen **C.** oxygen **D.** moisture

Structured Questions

1. Name three components of the circulatory system.
2. Name the four chambers of the heart.
3. State two functions of the circulatory system.
4. List three functions of blood in the human body.
5. State four components of blood.
6. State three substances which are transported in blood.
7. What is the function of platelets in the blood?

Unit 3

NUTRITION

Unit Objectives

At the end of this unit, learners should be able to:

(a) identify food preservation methods.
(b) classify food preservation methods.
(c) demonstrate food preservation.
(d) justify the importance of preserving plant food.
(e) list indigenous foods.
(f) highlight the importance of indigenous foods.
(g) make an indigenous dish.
(h) distinguish between indigenous and the GMO foods.

Looking Back

In grade 5, you studied the effects of improper eating habits and deficiency diseases. Some of the deficiency diseases are obesity, kwashiorkor, marasmus, skin scurvy and night blindness. In grade 6, you studied ways of preventing and management of deficiency diseases. These measures include eating a balanced diet food and doing regular exercises. In this unit, you are going to study the methods of preserving food.

Key Words

Food preservation	– refers to the treatment which is done on food to prevent it from rotting and to enable food storage for a long time.
Pathogens	– are micro-organisms which cause diseases in people or cause food to rot.
Exotic methods	– these are methods which came from other countries and are now used here in Zimbabwe.
Biltong	– is meat that is preserved by adding salt on it and drying it in the sun.
Genetically Modified Organisms	– are plants or animals containing genetic material that has been artificially changed so as to produce desired characteristics.

Food preservation

Food preservation means treatment of food so that food can be stored for long time without it rotting. If plant food is not preserved, it will rot and its shelf life is reduced. Food which is not preserved will rot quickly and become unsuitable for human consumption. Micro-organisms which include fungi and bacteria cause food to rot if the food is not preserved. Micro-organisms are more active on food which contains water in them.

Foods such as fruits, meat, fish, beans, peas, maize and vegetables need to be preserved for them to last for a long time. Food preservation prevents the growth of micro-organisms on food which cause spoilage of food through rotting and diseases.

Methods of preserving food

Methods of preserving food can be divided into two types which are indigenous methods and exotic methods.

Indigenous methods of preserving food

Indigenous methods of preserving food are salting, drying or dehydration, smoking and sugaring.

1. Salting

This is food preservation method whereby salt is added to food to be preserved. Salt removes or drains out water from food to be preserved and stored. Most of the micro-organisms such as bacteria and fungi which cause food to rot survive on moist foods. Once moisture or water is removed from food, that will increase shelf life of food. Examples of food which can be preserved by adding salt on food are meat, fish, beacon and vegetables.

Salted fish

2. Smoking

Smoking is a method whereby food is placed or hung on the fire place so that smoke goes on food. Smoke contains some chemicals from wood which kills some bacteria and fungi. A lot of smoke is released where food is placed. Examples of foodstuffs preserved through smoking are fish, pork, cooked maize cobs, and meat.

Smoking meat

3. Drying

Drying involves putting food to be preserved in the sun or where there is heat to dry the food. Drying removes water from food to be preserved.

The removal of water or moisture will prevent growth of some bacteria and fungi on food. Examples of foods which can be preserved using drying methods are biltong (meat), fish, vegetables, dried fruits like tomatoes used to make soup and some fruits.

Sun dried vegetables

Exotic methods of preserving food

Exotic methods of preserving food are refrigeration, canning and prickling.

1. Refrigeration

Refrigeration means keeping the food to be preserved in a refrigerator or fridge. The food to be preserved is frozen or stored at temperatures below 4°C. Bacteria and fungi are not able to grow and breed under very low temperatures.

This makes it possible to keep food for long time without it rotting. Examples of foods which can be preserved through refrigeration are milk, vegetables, meat, fish, fruits and cooked food.

Refridgerated foods

2. Canning

Canning means putting and storing food in sealed tins or cans. The food is heated at high temperatures first above 90C and then it is put into tins which are then sealed. The metal tins where the food is put are sterilised first and hot food is then put into them. Bacteria and fungi are killed with high temperatures and will not survive in tins or cans which are sealed where there is no air. Examples of food which can be stored in tins or cans are fish, meat, tomatoes, beans, soups, jam and fruits.

Canned foods

3. Pickling

Pickling is whereby a chemical like vinegar is poured or put on food to be preserved. Vinegar helps to preserve food by preventing some bacteria from growing on food. Examples of foods preserved using pickling method are fried chips and meat.

Fried chips

Indigenous foods and herbs

Indigenous foods and herbs are foods which are obtained from local indigenous plants, weeds and herbs. Some of the indigenous plants grow naturally in the wild while some are grown by people. The indigenous foods are not refined therefore contains some roughages. Examples of indigenous foods plants are black jack leaves, pig weed leaves, cleome (nyovi, ulude), cowpeas, beans, sorghum mealie meal, rapoko mealie meal, pearl millet mealie meal, pumpkins, cassava, okra and squash.

Black jack plant

Benefits of indigenous foods and herbs

- Indigenous foods and herbs are nutritious foods and are rich in proteins, iron and minerals.

Turn the drowning person's head to the side, allowing any water to drain from his or her mouth and nose. Turn the head back to the centre.

Begin mouth-to-mouth resuscitation on land, if possible, or in the water if the injured person needs immediate life-and-death measures.

Strongly breathe four times into the mouth of the injured person as you pinch his or her nose. This helps air get past any water that is clogging the breathing passageways and the lungs.

After four strong breaths, put your ear near the mouth and watch the chest for any breathing movement.

Check the pulse for signs of life.

Repeat the cycle.

Unit 6

ELEMENTS, MIXTURES AND COMPOUNDS

Unit Objectives

At the end of this unit, you should be able to:

(a) distinguish between metals and non-metals.
(b) identify characteristics of metals and non-metals.
(a) suggest examples of metals and non-metals.

Looking Back

In Grade 6, you learnt about the reaction of materials to different conditions like heat, water, oxygen and acids. Some of the reactions included, melting, rusting, dissolving, hardening, weakening and becoming heavy or light.

Key Words

Brittle – easily broken into fragments.
Ductile – possessing the ability to be pulled or stretched into wires.
Electrocution – death or severe injury caused by the body's exposure to electric current.
Insulators – materials that do not conduct electricity.
Lustre – having a quality of shine.
Malleable – possessing the ability to be moulded into various shapes by hammering, pressing or bending.
Metal – a solid element that has the ability to conduct heat.
Non-metal – a gas, solid or liquid element that is not able to conduct electricity.
Sonorous – having the ability to produce a ringing sound when stricken or dropped.

Metals and non-metals

Materials in the environment are primarily made of two categories of substances which are metals and non-metals. We come to the conclusion of these categories through classifying their properties and characteristics.

Characteristics of metals and non-metals

Metals are good heat conductors. This means that they allow heat to pass through them. They also have high heat resistance therefore; it takes very high temperatures to melt them.

Unit 7 TOOLS

Unit Objectives

At the end of this unit, you should be able to:

(a) modify domestic tools.
(b) repair tools.
(c) manipulate ICTs to design tools.

Looking Back

In Grade 6, you learnt that machines reduce the cost of production and make difficult tasks easier. You learnt that machines reduce the time used in carrying out tasks and produce error free, quality products. You also learnt that designing quality machines requires knowledge and skills.

Key Words

3D model – a designed image showing its length, width and depth.
Automotive tools – tools for fixing cars.
Hardware tools – tools for fixing or renovating any broken or damaged parts in a house and also include garden tools.
Tool – a device or implement that performs a specific function.

Tool repair and modification

A tool is any hand held implement which serves the purpose of performing a function. Domestic tools are those that can be found at home. The most common domestic tools are gardening tools. However, there are others that can also be found in homes such as kitchen utensils, sewing equipment, hardware tools and automotive tools.

We need tools because they help us to perform tasks effectively. An example of a kitchen implement that does this is a potato peeler. It effectively removes the peels leaving a cleanly peeled potato without hurting the hands of the peeler.

Potato peeler

Tools can be repaired and modified by bending, twisting, straightening, joining, cutting, trimming, extending, hammering, loosening, tightening, insulating.

Sharpening a screw drive

Spanner modified by bending

Repairing a broken garden fork

Repairing a pair of scissors

Use of ICT to design tools

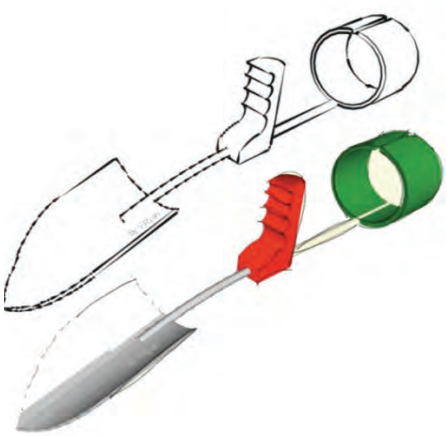
ICTs can be very useful in designing tools. They help you put your imagined tool into perspective. Concepts like shape, length, colour and texture. can all be utilised to design the intended tool model.

You might want to design a tool to improve its existing version or simply to invent your own tools according to your needs.

There are various **3D model** design programmes or software that are available on the internet. You can download them and use them to design your desired tools.

They allow you to select required shapes, merge, separate, drag, shift or adjust the sizes and colours until you come up with your desired model in the dimension you specified.

Some examples of designing software are Tinkercad, Freecad, Fusion 360 and Blender amongst many others.



Designing a tool using ICT

Unit

8

STRUCTURES

Unit Ojectives

At the end of this unit, you should be able to:

(a) make models of mechanical structures.

Looking Back

In Grade 6, you learnt about functions of structures such as bridges, dams and buildings and how they enhance the quality of human life. You learnt how structures made of steel resist both tensional (pulling) and compressional (pressing) forces. Structures of monumental value were covered to remind you of our country's treasured past.

Key Words

Mechanical structures – tools or machines made up of two or more connecting pieces.

Models of mechanical structures

A structure as any object or building that is designed to carry or support heavy loads. A simple chair is an example of a structure. Examples of large structures include electric pylons, dam walls, buildings and bridges.

Mechanical structures are interconnected assembled pieces of a tool or machine. These pieces are designed to connect or fit well with each other. When they are joined, they form a tool or machine that is intended to perform a specific function.

Mechanical structures range from simple to complex ones. Some mechanical structures may have as few as two pieces while others have as many as hundreds or thousands of pieces. Examples of mechanical structures include wheelbarrow, sewing machine and car.

Model of a car

Test 1

Paper 1: Multiple Choice Questions [1 hour 30 minutes]

There are 50 multiple-choice questions and you are required to answer all.

1. The approximate percentage of oxygen in expired air is _____.
   A. 16% B. 4% C. 20% D. 0,04%
2. Gaseous exchange occur in which structure?
   A. Bronchi B. Alveoli C. Rib cage D. Trachea
3. One of the functions of the respiratory system is to _____.
   A. clot the blood B. transport blood C. reproduction D. exchange gases
4. _____ air is breathed by a person.
   A. Carbon dioxide B. Oxygen C. Nitrogen D. Hydrogen
5. When bronchi become infected with some bacteriaor become blocked, a person is likwly to suffer from _____.
   A. typhoid and anthrax B. malaria and measles
   C. rabies and flu D. tuberculosis and pneumonia
6. Gas exchange in the body takes place in the _____.
   A. mouth B. lungs C. heart D. liver
7. Oxygenated blood contains _____.
   A. carbon dioxide B. oxygen
   C. nitogen D. milk
8. How many lungs are in the human body.
   A. 4 B. 3 C. 2 D. 1 in moods
9. How many chambers does a heart have?
   A. 5 B. 4 C. 3 D.2
10. The purpose of valves in the heart is _____.
    A. to make blood to flow very fast.
    B. to stop blood from flowing back into the heart.
    C. to make the heart stronger.
    D. to separate water and blood
11. Which vessels carry blood to all body cells?
    A. Veins B. Capillaries C. Arteries D. Immunity
12. The pH of blood is_____.
    A. 10% B. 9% C. 7,4% D. 5%
13. Which component of blood makes blood to clot?
    A. Plasma. B. Platelets. C. Red blood cells. D. White blood cells.
14. The maintenance of the internal environment at constant level is called _____.
    A. pH. B. Blood pressure C. Homeostasis. D. Immunity.
15. Which of the following is an indigenous food from an herb?
    A.Fish. B. Eggs. C.Okra. D. Meat.
16. Salt preserve food by _____.
    A. increasing water on food B. draining out water from food
    C. causing food to rot D. attracting some flies

What is the name of the organ C?

A. Bronchus B. Lung C. Diaphram D. Trachea

30. The mouth connects to the _____.

A. lungs B. wind pipe C. tongue D. diaphram

31. _____carry oxygenatd blood into the left atrium of the heart.

A. heart B. Pulmonary veins C. Arteries D. Heart

32. The _____ pumps the blood throughout the lungs.

A. lungs B. veins C. liver D. heart

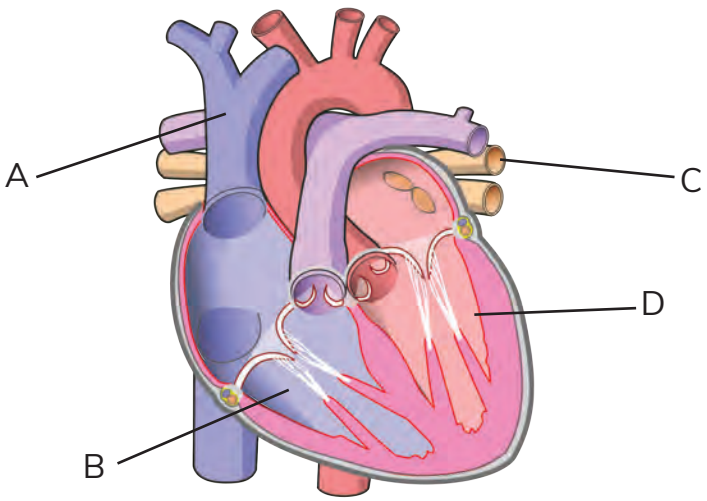
33. Gaseous exchange takes place in the _____.

A. alveoli B. air sacs C. heart D. diaphram

34. The cirulatory system of human body is _____.

A. the way in which blood flows around in the body
B. the transportation of blood that does not have oxygen
C. watery liquid in the body
D. whereby white blood cells destroy bacteria

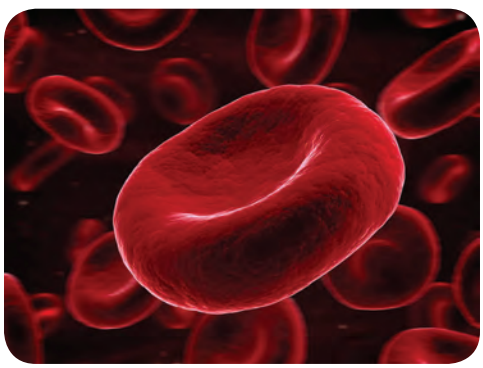
35. Use the following diagram to answer the question 35 and 36.



Which one is a venacava?

36. Which one is a pulmonary vein?

37. What is shown in the diagram below?



A. Veins B. Red blood cells C. White blood cells D. Platelets

Paper 2

Structured Questions

This paper comprises of Section A and B.

Section A

Section A with approximately 30 questions is compulsory and carries 3 marks.

1. (a) (i) The air that people breathe in is called _____. [1]
   (ii) Name four parts which makes the respiratory system. [1]
   (b) Draw a respiratory system and label it. [3]

2. (a) What is the function of the lungs? [1]
   (b) Gaseous exchange occurs in the _____. [1]
   (c) How are the gases exchanged in the alveolus? [2]

3. (a) What is a circulatory system? [1]
   (b) The cirulatory systems consists of _____ and _____. [1]
   (c) Blood is pumped through vessels which are _____, _____ and _____. [3]

4. (a) List any two functions of the heart. [2]
   (b) Draw and label a respiratory system. [3]

5. Give any one function of each of the following parts of the heart:
   (a) Veins. [1]
   (b) Capillaries. [1]
   (c) Arteries. [1]
   (d) Blood vessels. [1]
   (e) Lower chambers. [1]

6. (a) What is blood? [1]
   (b) List the components of blood. [2]
   (c) Identify any two functions of blood. [2]

Section B

Section B is a choice section which carries 20 marks. A candidate is expected to choose 4 out of 6 questions. Each question carries 5 marks.

7. (a) List any three substances transported in the blood. [3]
   (b) Write down any two uses of the substances you wrote in (a). [2]

8. (a) Name three types of blood vessels. [3]
   (b) Name the type of cells that carry oxygen in the human body. [2]

Unit 9 ENERGY

Unit Objectives

At the end of this unit, you should be able to:

(a) demonstrate that sound travels through air, solids and water.
(b) illustrate different ways of producing sound.
(c) explain electromagnetic radiation.
(d) identify appliances which generate electromagnetic radiation.
(e) demonstrate an understanding of the uses of electromagnetic radiation.
(f) describe how energy is converted from one form to another.
(g) illustrate energy efficiency.

Looking Back

In Grade 6, you learnt about how electrical energy is generated by thermal, solar, hydro, wind and nuclear energy. You established that solar, wind and hydro-energy are clean sources of energy and are also renewable forms of energy. Conserving electrical energy was presented as a way to save non-renewable resources for future generations. You also explored tasks performed by electrical gadgets to make life easier for human beings and how to prevent electrical hazards by taking safety precautions before, during and after using electrical gadgets.

Key Words

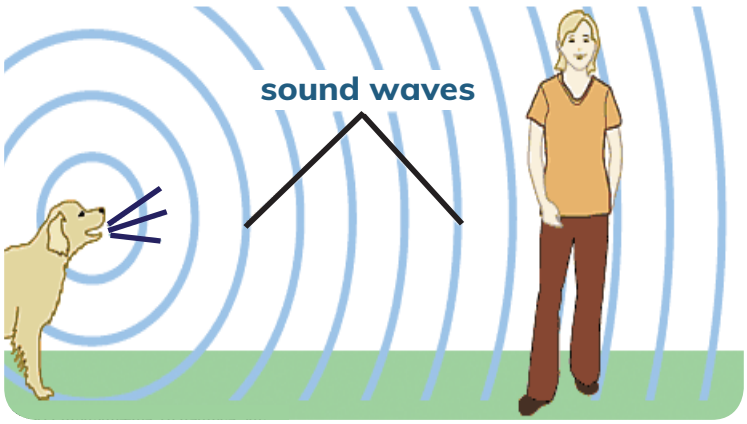
Electromagnetic radiation	– energy in the form of moving waves.
Electromagnetic spectrum	– the arrangement of radiation waves according to their length.
Energy chain	– the change of the form of energy before use.
Energy conversion	– the change of energy from one form to another.
Energy efficiency	– the use of less energy to complete the same task.
Sonar	– echoing sounds used to detect objects in large bodies of water.
Vibration	– a quick repeated movement.

Sound energy

Energy produced by the vibration of materials. Almost any material can vibrate to produce sound. Metals, wood, glass and plastic are examples of materials that can make sound. Musical instruments produce sound when they are made to vibrate. An example is that when a guitar is strummed it produces sound by vibrating.

A guitar vibrating to produce sound

Living things like people and animals are also able to make sounds. People make sounds by talking, laughing, crying, singing, whistling and sighing. Like materials, people make sound through vibration. The voice box in the throat vibrates to enable the production of sound.



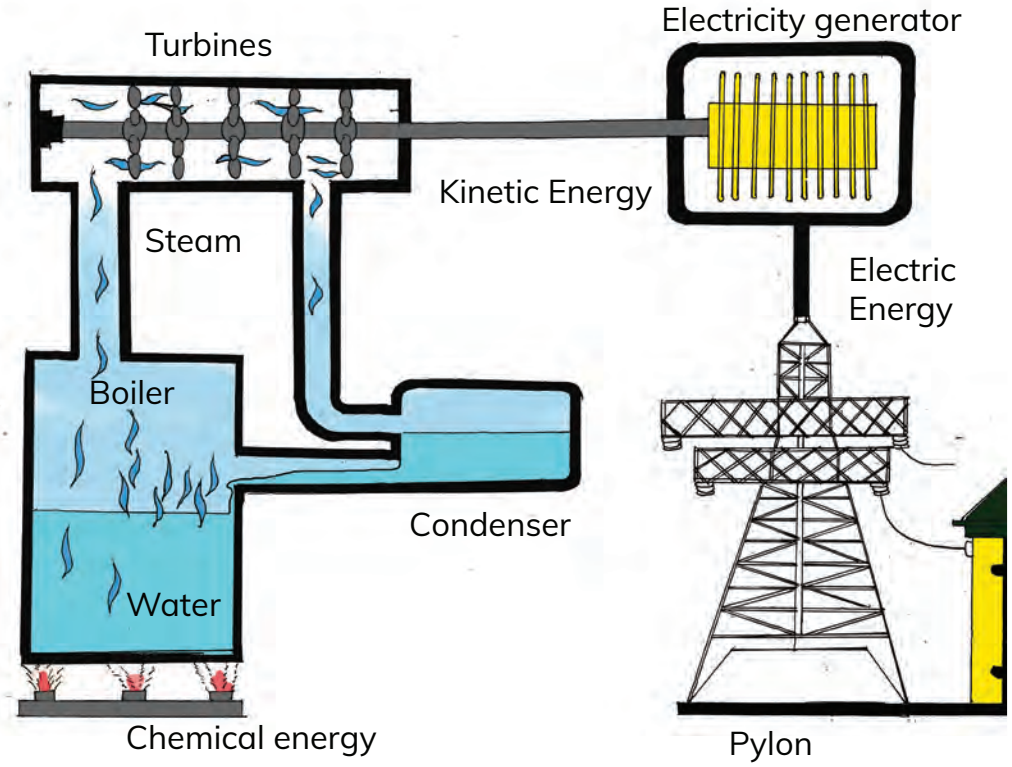
Sound travelling in the air

For us to hear sound, it has to travel from its source to our ears. Sound travels through air, water and solid materials by sound waves. The sound of a dog barking is an example of sound travelling in the air.

Making a sound in a large empty room can cause an echo. This is because the sound hits the wall and returns in the direction it came from through the air.

Sound travelling through a solid material

Another example is that when one person makes a sound from a different room in the same house such as calling or knocking on the door, he/she can be heard from the other rooms even when the doors are closed.

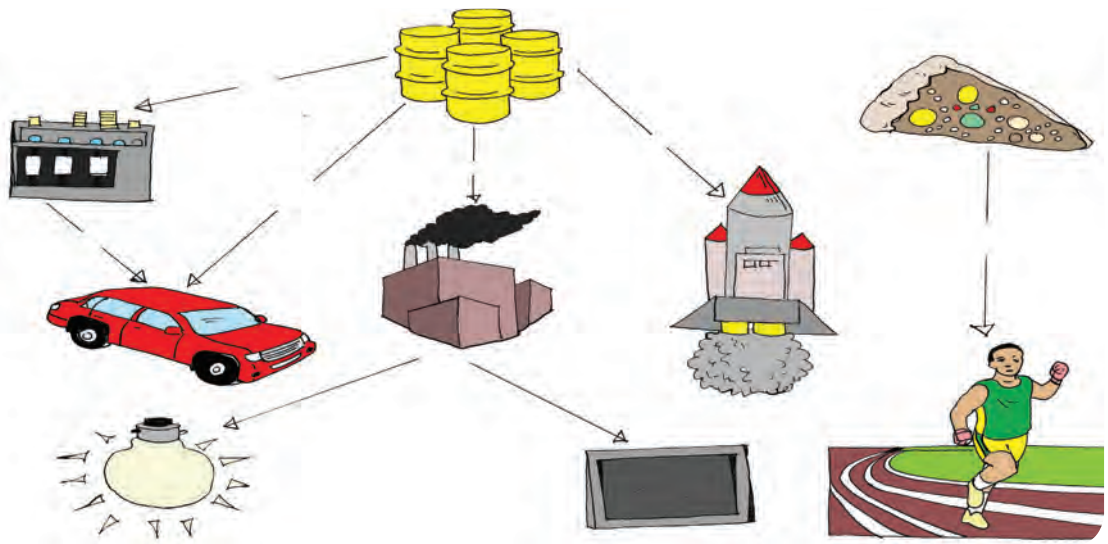


The conversion above can be simplified as follows:

Chemical energy → **Heat energy** → **Kinetic energy** → **Electrical energy**

NB: Electrical energy can further be converted into other forms of energy like heat, light or kinetic energy by using appliances like irons, bulbs and fans respectively.

There are many examples of energy chains you can think of. Observe the diagram below to see different ways of energy conversions.



Key points in this unit

- Sound travels through air, solids and water.
- Sound is produced by different materials.
- Electromagnetic radiation is energy in the form of moving waves.
- Various appliances for home use, in communication technology and medical technology generate or use electromagnetic radiation.
- Energy cannot be created or destroyed but can be converted from one form to another.

Unit Revision Exercises

Multiple Choice Questions

1. Energy produced by the vibration of materials is called _____ energy.
   A. sound **B.** thermal **C.** wind **D.** solar
2. Sound is not able to travel through _____ _____.
   A. solids **B.** water **C.** light **D.** air
3. Which electromagnetic radiation is used by a satellite communication system?
   A. Infrared **B.** Ultraviolet **C.** Microwaves **D.** Radio waves
4. Which one of these is harmless radiation?
   A. Light **B.** Gamma rays **C.** X-rays **D.** Ultraviolet
5. An electromagnetic radiation that has short waves is _____.
   A. infrared **B.** x-rays **C.** visible light **D.** radio waves
6. Which one of these has the longest radiation waves?
   A. Visible light **B.** Radio waves **C.** Microwaves **D.** Infrared
7. Wood is an example of a material containing _____ energy.
   A. heat **B.** light **C.** mechanical **D.** chemical
8. Which one of these appliances converts electrical energy to kinetic energy?
   A. Laptop **B.** Stove **C.** Fan **D.** Toaster

Structured Questions

1. What is electromagnetic radiation?
2. Give two sources of electromagnetic radiation.
3. _____ have the shortest waves on the electromagnetic spectrum.
4. The most harmless waves of radiation are the _____.
5. Give one example of an energy chain.
6. Explain why energy is not destroyed in that chain.
7. Give two advantages of energy efficiency.

Unit 10 FUEL

Unit Objectives

At the end of this unit, you should be able to:

(a) explain the causes of veld fires and their effects.
(b) suggest ways of controlling veld fires.

Looking Back

In Grade 6, you learnt about the sustainable use of fuel in order to conserve resources for future generations. You also learnt of the alternatives that could be used as fuel such as biogases and biofuels from biomasses. Do you remember any examples of these green fuels?

Key Words

Acid rain	– rain polluted by gases in the atmosphere which are produced by combustion of fuels.
Greenhouse gases	– gases produced by combustion that are responsible for global warming by retaining heat in the atmosphere.
Ozone layer	– a layer above the atmosphere that protects humans from direct contact with ultra violet rays.

Impact of fuels on the environment

The high demand for energy from fuels has a negative impact on our environment. Some of the impacts include the loss of habitats for humans and animals, acid rain and climate change.

Veld fires

A veld fire is a large fire that covers a large area of land and is very difficult to extinguish. It cannot be easily extinguished because of its size and because of the rapid speed in which it spreads. Veld fires have various causes. Some causes are natural while other causes are a result of irresponsible behaviour.

Veld fires

Unit

11

ELECTRONICS

Unit Objectives

At the end of this unit, you should be able to:

(a) state the functions of the components of an electronic device.
(b) make an electronic device of own choice.

Looking Back

In Grade 6, you learnt about alternating current and direct current. You looked at their advantages and disadvantages in terms of cost, safety, transmission to short and long distances and amount of voltage transmitted in terms of the devices and gadgets requirements. Do you remember the difference between alternating and direct current?

Key Words

Amplifier – a device that increases volume by changing weak sound signals to strong ones.
Switch – a device used for opening and closing circuits with low voltage loads.

Components of electronic devices

Electronic devices are modern gadgets that are able to process information by controlling the flow of electrons.

Examples of electronic devices are smartphones, laptops, video games, digital cameras, video recorders, printers, DVDs, television, camcorders and calculators.

Some of the components of electronic devices are transistors, diodes, inductors, resistors, capacitors, integrated circuits and power sources. The most important are the transistors and diodes.

Electronic devices

Resistor

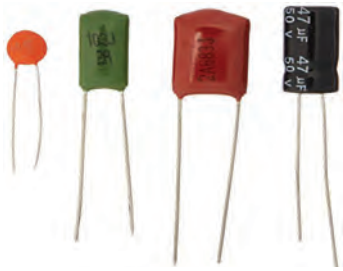
A resistor is a tiny object that reduces the flow of current. This is necessary because it ensures that the flow of current is controlled so it does not damage the gadget.

Resistor

Capacitor

A capacitor is a layer of insulating material. It has a conductive surface on its sides.

As an insulator it stores electrical energy. Since it has a conductive surface, it is able to release electrical energy when it is needed.

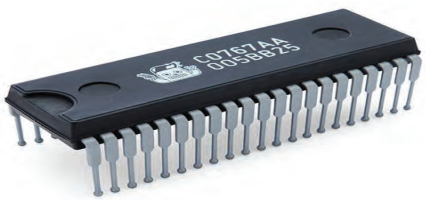


Capacitors

Integrated circuit

When several electronic components such as transistors, capacitors, resistors and diode. are made into one circuit, it is called an integrated circuit.

Integrated circuits are also known as chips or microchips. Integrated circuits can be found in electronic devices such as laptops, smartphones and televisions.

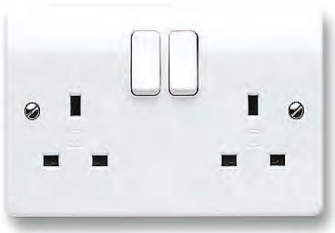


Integrated circuit

Power source

Laptop charger

Phone charger



Socket outlet

In order for electronic devices to function, they need to be powered by electricity, therefore, there should be a power source. The most common source of power is from a socket outlet attached to walls in most urban households.

Devices are powered by inserting the pins of adaptors or chargers into electrical socket outlets on one end and into the charging port of the electronic device on the other end. Other power sources can be from batteries.

When batteries are charged, they can be inserted into the device to complete an electrical circuit and provide electricity to the device. Power sources are important in that they provide a regulated amount of electricity to prevent the device from damage due to high voltage. They are also important in that they provide power in the correct proportion to enable the device to function.

Activity 1

1. *Identify the components of electronic devices.*
2. *Discuss the functions of components of electronic devices.*

Activity 2

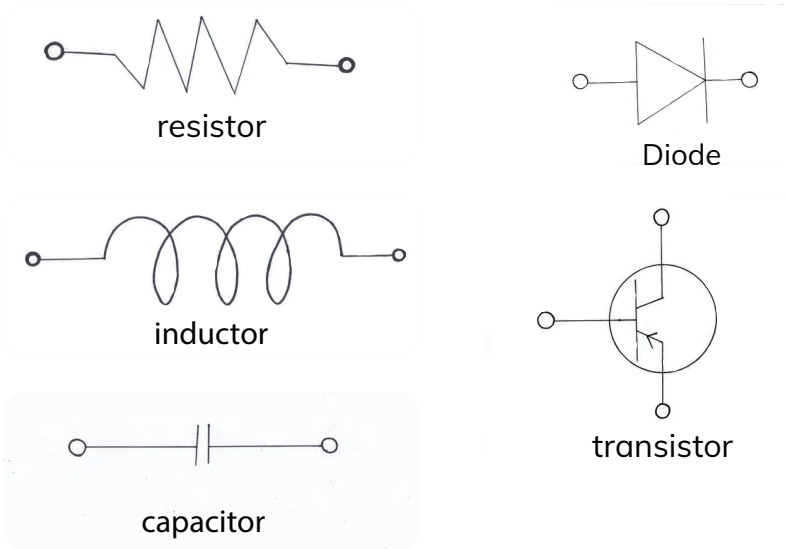
Design a model of any electronic device using locally available materials.

Exercise 2

1. Name two ways in which a transistor is used.
2. What is the function of an inductor?
3. What is an integrated circuit?
4. Which electronic device component protects a device from damage by reducing the flow of current?
5. Which two electronic device components can be found only in electronic devices and not in electrical devices?
6. What is another name for an AC resistor?

Symbols of electronic devices

Electronic devices have symbols that represent them in diagrams. Study the symbols below.



Symbols of electronic devices

Activity 3

Draw electronic device components and match them with their symbols shown in the drawing above.

Unit

12

GRAVITY

Unit Objectives

At the end of this unit, you should be able to:

(a) deduce that there is a force attracting objects to fall.
(b) recognise that gravitational force acts at a distance like magnets.
(c) recognise that some mechanisms allow a small force to have a greater effect.
(d) design and make a pulley system.

Looking Back

In Grade 6, you learnt about magnets. You looked at the magnetic force of attraction and repelling; magnetic materials including iron, nickel and cobalt; non-magnetic materials like glass paper, rubber, plastic, wood; and uses of magnets including determining compass direction, lifting heavy metal objects and keeping refrigerator doors firmly shut.

Key Words

Axle – a rod that passes through the middle of a wheel.
Beam – any long piece of metal, wood or stone on a lever designed to support loads to be lifted.
Fulcrum – the support on which a lever turns.
Load – object with mass carried or lifted by any force magnifier.
Space – the empty area between planets.

Gravitational force

Gravitational force is attraction between all objects that have mass towards the centre of the earth. It keeps us down on earth. Objects that have more mass are stronger, therefore, they have a higher gravitational pull. They pull the objects with lighter mass towards them.

Gravitational force always has a pulling effect. It does not have a repelling or pushing effect like magnets.

This means that objects will always pull together or move towards each other without an effort of pushing the objects towards each other.

This means that objects close to each other are pulled quicker towards each other than objects from a greater distance. This is similar to how magnets easily pull metals closer to it than those that are far from it.

Activity 3

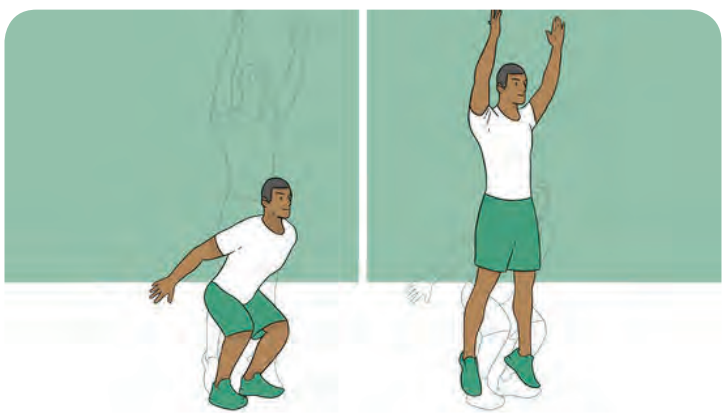
Discuss in groups, gravitational force at a distance using the last illustration on page 84.

1. *Predict which ball you think will reach the ground first.*
2. *Which ball do you think will reach the ground last?*
3. *(a) Which ball will reach the ground second?*
   (b) Which ball do you think has the strongest gravitational force?
   (c) Why do you think so?
4. *(a) Which ball do you think has the weakest gravitational force?*
   (b) Why do you think so?

Application of gravitational force

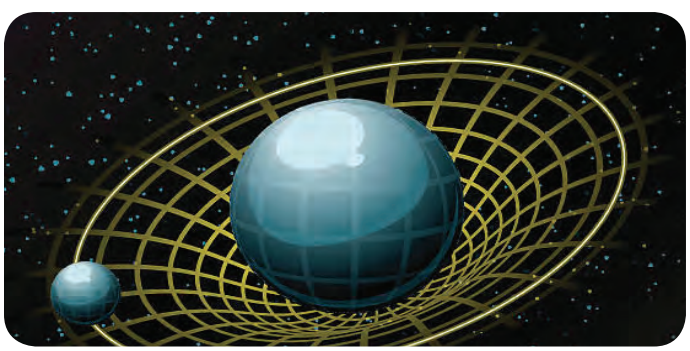
Gravitational force applies according to the universal law of gravitation formulated by Isaac Newton.

It applies between objects with mass on earth such as human beings and the earth. In this way, gravitational force forces objects close to the earth to remain on the surface, for example, when animals and human beings jump, they come back down and are unable to fly into **space** or remain in the air. Ultimately, they all return to the ground.



Gravitational force bringing a man down after jumping

The movement and rotation of the moon around the earth is caused by gravitational force. It helps the moon not to move away from the earth in any direction but to maintain an orbit around the earth. This force also applies to the earth's rotation around the sun and the movement of stars in the galaxy.



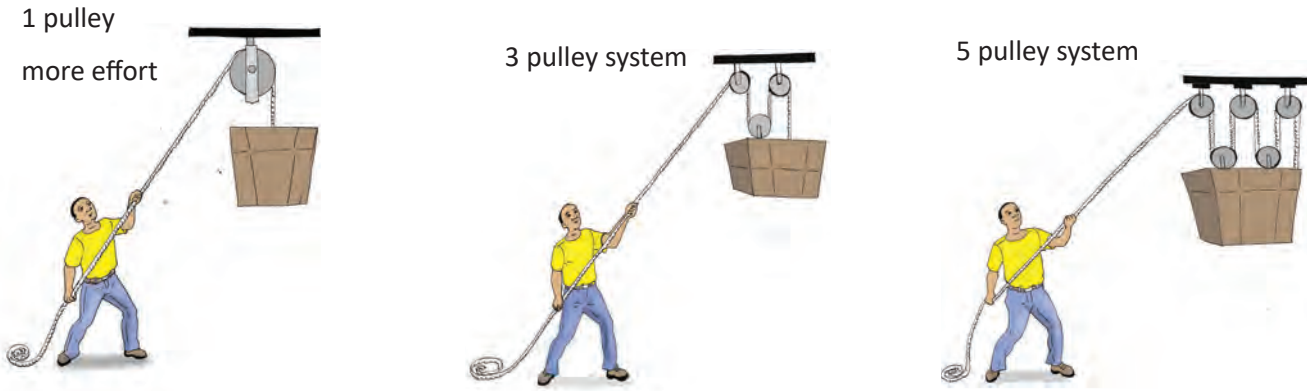
Moon rotating around the earth as a result of gravitational force

on its edge to ensure that the rope is held in place in the centre of the wheel. A pulley has an **axle** to keep its wheel in the same position. The axle allows the wheel to turn. A pulley works by pulling the rope down while lifting the **load** up. This is where movement and changing of direction of force can be observed.

A man using a pulley to lift a heavy object

Pulleys are important because they the enable human beings to lift heavy objects. They multiply the force exerted on them by human beings. This means that the effort that is put by a person in pulling the rope is increased by the pulley making it possible for the heavy object to be lifted.

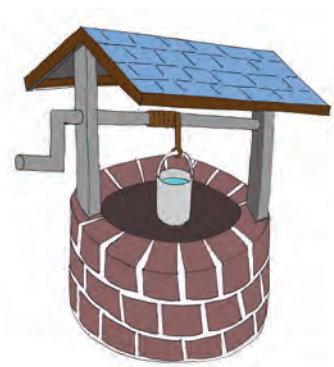
More than one pulley can be used to lift one or more objects. Using more pulleys makes it easier to lift the same object because less effort is required to pull the rope. When lifting very heavy loads it is good to consider using more than one pulley.



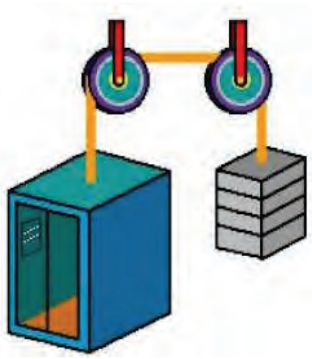
you are applying the force along in much longer distance

Using more pulleys requires less effort

Some examples of pulleys that people use every day to lift objects are shown below.



Water well



Elevator pulley system

Crane pulley

Flagpole pulley

Activity 4

Design and make your own pulley system.

3. One example of a pulley system is a _____.
   A. tide **B.** shovel **C.** well **D.** clock
4. Another name for the pivot point in a lever is _____.
   A. fulcrum **B.** rope **C.** gear **D.** wheel
5. An example of a type of gear is _____.
   A. bottle opener **B.** flagpole **C.** elevator **D.** herringbone

Key points in this unit

- Gravitational force attracts objects to fall.
- Two objects need mass for gravitational force to take effect.
- Gravitational force acts at a distance like magnets.
- Force multipliers such as pulleys, levers and gears cause a small force to have a greater effect.

Unit Revision Exercises

Multiple Choice Questions

1. Gravitational force has a _____ effect.
   A. repelling **B.** pushing **C.** pulling **D.** magnetic
2. Which one of these is a force multiplier?
   A. Gravity **B.** Lever **C.** Effort **D.** Force
3. Which one of these uses a gear to operate?
   A. Stapler **B.** Well **C.** Car **D.** See-saw
4. A wheelbarrow is an example of a _____.
   A. lever **B.** axle **C.** pulley **D.** gear
5. Which one of these is part of a pulley?
   A. Axle **B.** Beam **C.** Pivot **D.** Teethed wheel
6. _____ uses a lever to function.
   A. A well **B.** A motorbike **C.** A stapler **D.** An escalator
7. Which one of these is a requirement for gravitational force to take place?
   A. Force **B.** Repelling **C.** Gears **D.** Mass
8. Gravitational force does not apply to _____.
   A. tides **B.** force multipliers
   C. earth's rotation around the sun **D.** objects with mass

Structured Questions

1. What is a force multiplier?
2. Give three examples of force multipliers.
3. What causes a car not to fall or slide down a hill or mountain?
4. What is a pulley used for?
5. In a pair of gears, one is a _____ gear and the other is a _____ gear.
6. Give three uses of gears.

Unit 13

DESIGN AND TECHNOLOGY

Unit Objectives

At the end of this unit, you should be able to:

(a) construct functional tools of your own choice incorporating the elements and principles of design.

Looking Back

In Grade 6, you learnt about various principles and elements of design in mechanical models. Which ones do you remember? We will look at the principles and elements of design first, then apply them to functional tools.

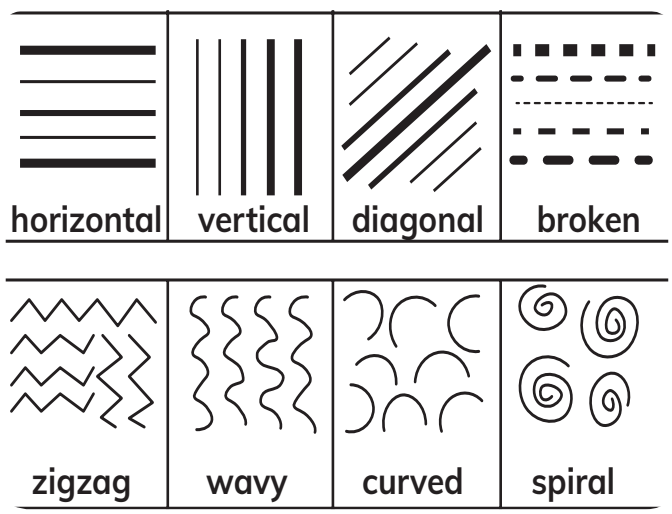
Key Words

Elements of design – items used to create a piece of work.
Enhancing appeal – improved appearance.
Lucrative – make a lot of profit by selling quickly.
Principles of design – descriptions of how elements of design are used.

Elements of design

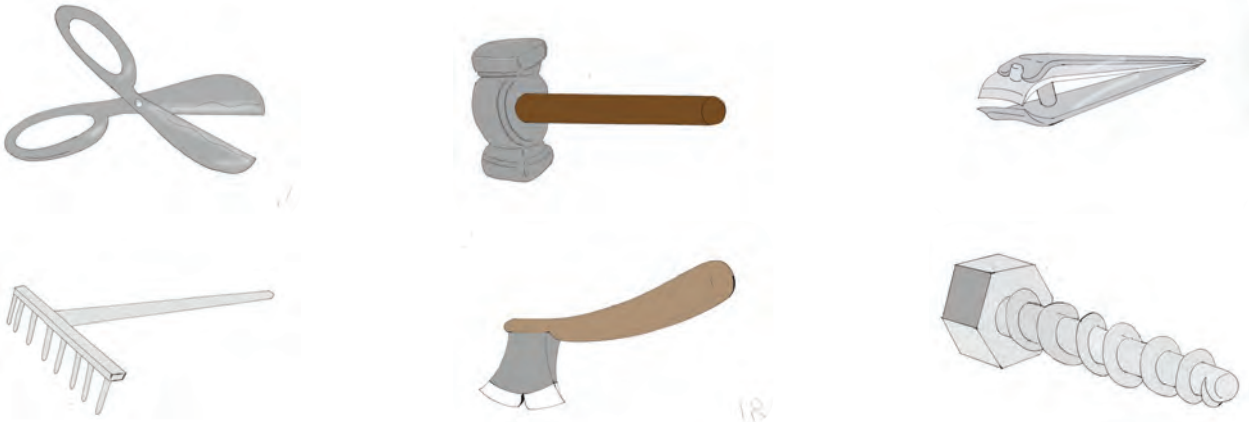
1. Line

A **line** is an element of design that is characterised by a moving point and gives a sense of direction. It is the simplest element of design to create. Almost every design will use the line element. Different types of lines include horizontal, vertical, curved, zigzag, smooth, rough, long, short, thick, thin, diagonal and spiral lines. The line element can be used to create other elements. Can you think of any tool and describe how line is used to create it?



Types of lines

2. Name one element and principle of design in each picture below.



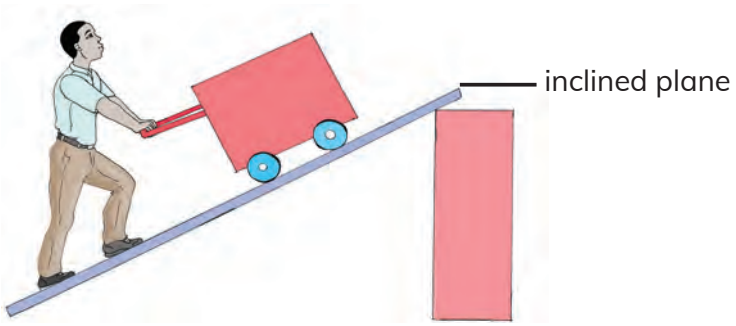
3. Explain how you would model your own pulley using any two elements of design.

Functional tools

A functional tool is any item that is designed to perform a specific task. Simple machines are examples of functional tools. Their function is to make pushing, pulling or lifting objects easy by multiplying the force exerted by human beings.

There are six groups of simple machines namely, pulleys, levers, inclined planes, wedges, screws, wheel and axle. Previously, you learnt about examples of pulleys such as a water well, flagpole, crane, elevator and levers including wheelbarrows, bottle openers, shovels, see-saws and staplers. Now we shall look at the other simple tools and their examples.

1. Inclined plane



Inclined plane

An inclined plane is a tool raised at one end to make it easy to raise or lower objects over a short distance. It is easier to move objects up or down when the plane is diagonal rather than lifting them vertically. Ramps are good examples of inclined planes.

People who need to use wheel chairs can use ramps as an alternative for staircases.

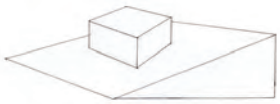
2. Wedge

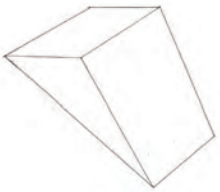
A wedge is a tool with a sharp or thin side and a thick one used to force materials to move in different directions.

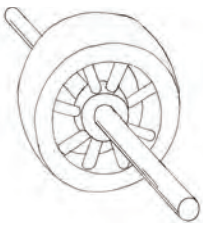
Examples of wedges

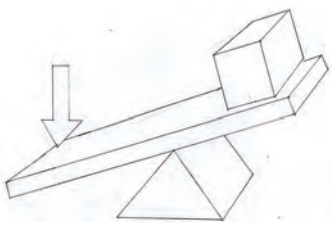
Exercise 2

1. Draw and name the simple machines below.
2. Explain how each machine is made.









Activity 2

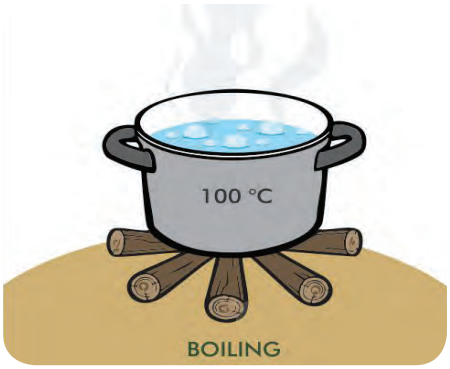
1. *In groups, observe and classify the tools below according to their function.*

2. *Using any elements and principles of design, design an example of an inclined plane, lever and wedge.*
3. *Exhibit your finished models.*

Visible impurities are all those contaminants in water which can be seen by a naked eye, for example grass, leaves and mud. Invisible impurities include chemicals, salts, microorganisms like bacteria and heavy metals like mercury, copper, chromium, nickel and lead. The main methods of water purification include boiling, filtration, distillation and chlorination.

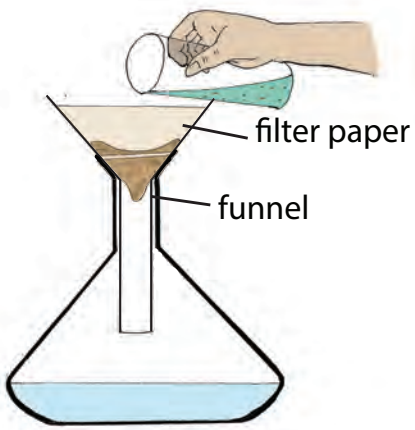
Boiling

Boiling is the cheapest and safest method of purifying water. Water should be boiled at 100°C for about 15 minutes. Although it does not remove visible impurities, it kills invisible pathogens like bacteria. Do you remember what pathogens are? Pathogens are disease-causing organisms. Boiled water is safe for drinking.



Boiling

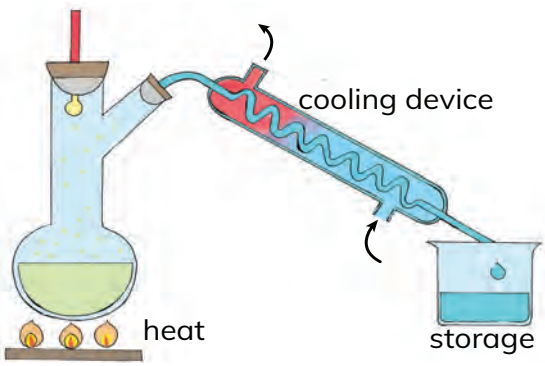
Filtration



Filtration process

Filtration is one of the effective ways of purifying water by removing most visible physical and biological impurities. It makes use of filter papers, funnel and collecting container. Water from filtration is not totally safe as it may contain invisible impurities like germs.

Distillation



Distillation process

Distillation is the most effective way of purifying water. Distillation involves use of heat to collect pure water in the form of vapour. Water is heated and when it boils, it evaporates and changes to steam or vapour which is collected and cooled in the cooling device (condenser).

The cooled vapour changes into liquid and is directed into a collecting container. Distillation removes both visible and invisible impurities.

Distillation can be illustrated using simple locally available home materials. Dirty water is poured in a kettle and heated until it boils.

A metal plate (with some ice inside, if available, to keep its outer surface cold) is held in the steam or water vapour that is escaping from the spout of the kettle.

Water evaporation

The water vapour cools when it touches the cold metal plate and condenses. It then runs off the plate into the collection container.

The visible and invisible impurities are left behind in the kettle once all the water has evaporated. The water collected in the collection container is very clean and safe for drinking.

Chlorination

Chlorination involves use of a chemical called chlorine to kill pathogens like germs. Chlorine tablets or liquid can be put in water where they will dissolve and kill all bacteria leaving the water clean and safe for drinking. However, chlorination may not remove other visible impurities like stones and leaves from the water.

Tablets

Water purification appliance

A water purification appliance can be designed and constructed using locally available materials. A water filter can be made using locally available materials.

Activity 2: *Making a water filter*

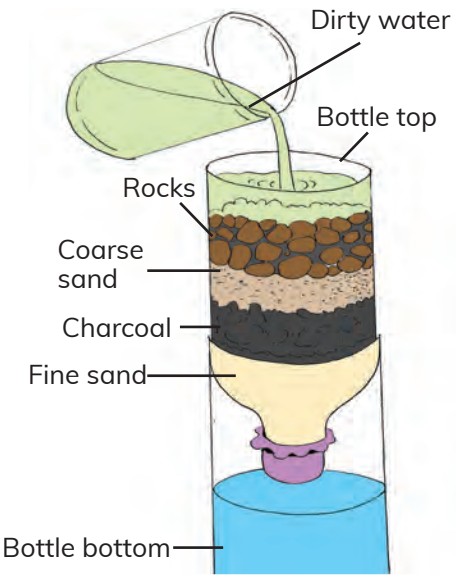
Materials needed:

Dirty water, coarse sand, fine sand, small rocks, charcoal, cotton wool or cloth and 2-litre plastic bottle.

NB: *You need to do this experiment in groups of six, under the supervision of your teacher.*

Method/Procedure:

1. *Collect a 2-litre empty plastic bottle. Cut it at the middle into two parts.*
2. *Take the bottle top part and turn it up-side down and place it onto the bottle bottom part. The bottle top part will act as your funnel.*



Unit

15 WEATHER AND CLIMATE

Unit Objectives

At the end of this unit, you should be able to:

(a) state the factors which influence climate.
(b) explain factors which influence climate.

Looking Back

In your previous grades, you studied on the weather instruments and how they are used to measure weather elements. Some of the instruments which are used to measure weather elements are rain gauge, which is used to measure amount of rainfall, and hygrometer which is used to measure humidity. Cup anemometer is used to measure wind speed. Try to remember some of the weather patterns which you studied when you were in grade 6. In this unit, you will study the factors which influence climate which occurs in a particular area.

Key Words

Weather – is the daily condition of the atmosphere at a particular place at a given time.

Climate – is the average weather conditions of a large area recorded over many years usually 30 years to 40 years.

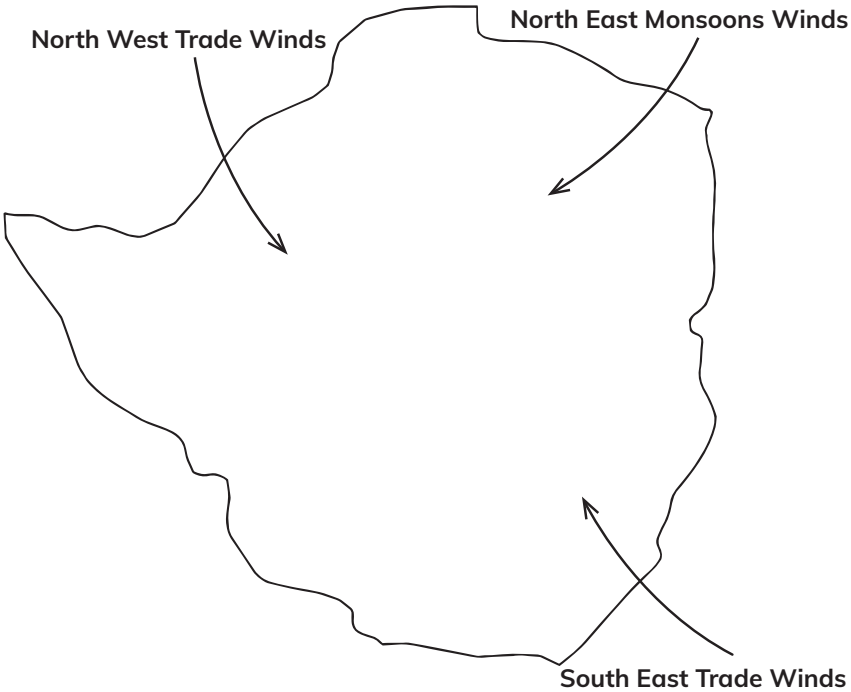
Factors which affect climate

The climate which occurs in a particular area is influenced by the following factors; altitude, latitude, distance from the sea, ocean currents, vegetation cover, trade winds, topography and aspects.

1. Altitude

Altitude is the height above sea level. The height above the sea influences climate which occurs in high places will experience low temperatures while low lying places will be hot. This is because higher places are occupied with less dense air which is cooler. Generally, temperatures fall or decreases with increase in height. Temperature falls or rise by 6,5°C per kilometre fall or rise in altitude. Temperatures decrease as altitude increases because

South East Trade Winds are also known as prevailing winds and these blow throughout the year. They are characterized with falling of continuous light showers and drizzle. The cause cloud conditions in winter. South East Trade winds blows from Indian Ocean from Madagascar.

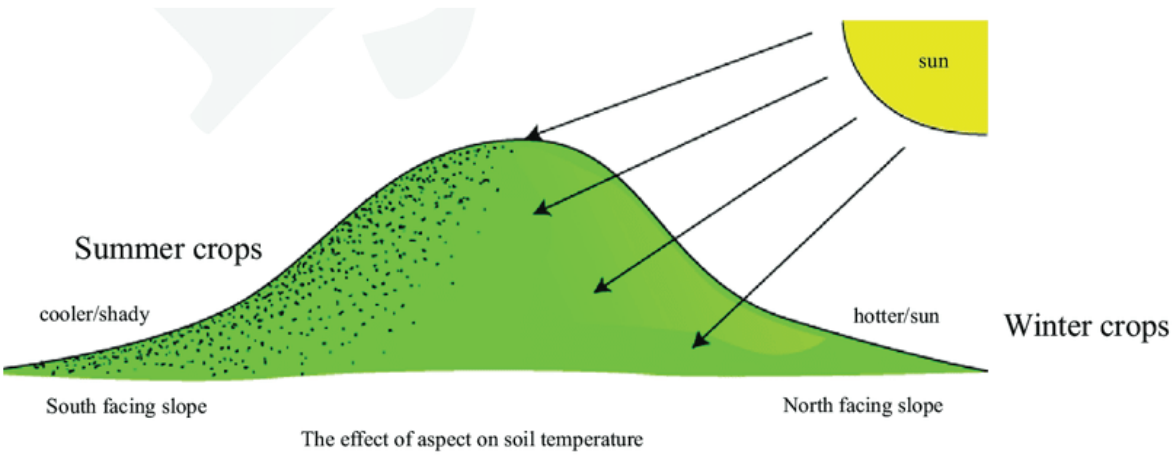


North West Trade Winds is also known as Zaire air - blows through Democratic Republic of Congo (DRC) formerly Zaire hence the name Zaire air. These winds blow only in summer.

North East Monsoons Winds only blows during summer and brings rainfall in Zimbabwe towards end of December to early January up to February.

All these winds at times converge in Zimbabwe when a low-pressure zone known as Inter Tropical Convergence Zone occurs and they bring a lot of rainfall.

Aspects



The effect of aspect on soil temperature

Aspect refers to the position where a place is located, that is whether it is sheltered or open place. Aspects influence climatic characteristics of an area. Places which lie in sheltered

- Factors which influence climate are altitude, latitude, distance from the sea, topography, trade winds, aspects, ocean currents and vegetation cover.
- Trade winds influence climate by bringing warm moist air which cause clouds formation and rainfall occurrence.
- Trade winds which are important in influencing climate in Zimbabwe are North West Monsoons Winds (Zaire air), the South East Trade Winds and North East Monsoons Trade Winds.
- Save Valley receives less rainfall than Chimanimani because it is located in the rain shadow area.
- Vegetation cover helps to create a micro-climate through shading effect and releasing water vapour into the atmosphere through transpiration which increases cloud cover in the area.
- Coastal places or places near the sea receive more rainfall than inland areas.

Unit Revision Exercises

Multiple Choice Questions

1. Which of the following is not a factor which influences weather and climate?
   A. Soil type. **B.** Altitude **C.** Trade winds **D.** Vegetation cover
2. The height above sea level is known as _____.
   A. altitude **B.** latitude **C.** trade winds **D.** vegetation cover
3. The type of rainfall which commonly occurs in mountainous areas is _____.
   A. relief rainfall **B.** rain gauge **C.** transpiration **D.** convectional rainfall
4. The distance of a place from the equator is known as _____.
   A. altitude **B.** ocean currents **C.** latitude **D.** trade winds
5. Why do areas located in the equatorial areas experience high temperatures?
   A. The areas always receive direct sun rays as the sun is overhead.
   B. The areas are located in wetlands.
   C. The places are located on mountains.
   D. The places are in deserts.
6. Wind always blows from _____.
   A. high pressure areas to low pressure areas
   B. from inland to oceans
   C. south to east
   D. ocean to ocean
7. Why are trade winds important?
   A. They bring cold temperatures.
   B. They bring sailors to Zimbabwe.
   C. They bring warm, moist air which brings rainfall.
   D. They are hated by sailors.
8. Why does Save Valley receive less rainfall than Chimanimani?
   A. It is located on the windward side near Mozambique.
   B. It lies in the rain shadow area.
   C. It is on top of mountains.
   D. It is near Indian Ocean.

3. Green houses

Green house

Green houses are buildings which are constructed using transparent polythene plastic papers or sheeting and horticultural crops are grown inside them. Green houses technology changes weather and climate by creating a micro-climate inside which is suitable for horticultural crops. Crops are inside green houses for the following reasons:

- To rise temperatures inside the green house.
- To protect crops against weather hazards like frost and hailstones.
- To grow crops throughout the year.
- To increase yield of horticultural crops by creating suitable environment favourable for growth of horticultural crops inside the green house.
- Green houses help to reduce some pests from attacking vegetables.
- It is also possible to regulate light received with flowers to promote flowering of plants like flowers.

Examples of horticultural crops which are grown in green houses are cabbages, tomatoes, peas, green beans, chillies, green pepper, cucumbers and cut flowers for export to Europe, Asia and America.

Weather forecasting for farmers

Weather forecasting is the predicting of how weather will be like or likely to be or the state of weather in the next day, next five days or for a month using instruments like satellites or radars.

Meteorologists are able to forecast or predict the state of weather accurately using sophisticated instruments like satellites. Weather forecasting can be given for short time range like daily forecast or long-range forecast like a week, month or year.

Weather forecasting information or data is given to people through televisions, radios, newspapers, and cellphones. Weather forecasting is done for farmers, pilots, ship crews, agriculture research and military personnel.

Key points in this unit

- Technologies such as cloud seeding, irrigation, green houses, weather forecasting and construction of large dams and lakes have some impacts on seasonal activities of people.
- Cloud seeding is the spraying of solid particles into the atmosphere using aeroplanes to promote clouds formation and rainfall occurrence.
- Cloud seeding is good to farmers because it makes more rainfall to fall and people will at the end grow crops successfully.
- Irrigation technology enables farmers to grow crops throughout the year and this improves household and national food security.
- Green house is a technology of building structures using polythene transparent plastic sheeting or glasses and horticultural crops are grown inside these buildings.
- Green houses protect crops from frost and pests as the crops will be covered with plastic sheeting or glasses.
- Weather forecasting gives people information on the weather condition likely to occur so that people can plan and prepare for their forthcoming activities.

Unit Revision Exercises

Multiple Choice Questions

1. Cloud seeding helps to increase _____.
   A. rainfall **B.** dust **C.** birds **D.** air in the atmosphere
2. Why is cloud seeding not usually done?
   A. It reduces the amount of rainfall received.
   B. It increases rain bearing clouds which are formed and rainfall.
   C. It wastes Government's money.
   D. It causes drought to occur.
3. Identify a reason why irrigation is an important technology.
   A. It makes farmers not to get workers.
   B. It makes farmers to grow crops throughout the year
   C. It makes the environment to be beautiful.
   D. It causes earthquakes.
4. Instruments which are used by meteorologists to see what is happening in the atmosphere during weather forecasting are _____.
   A. stevenson screen and wind vane **B.** radars and satellites
   C. rain gauges and thermometers **D.** cup anemometer and meters
5. Weather forecasting information or data benefits more which group of people?
   A. Teachers. **B.** Farmers. **C.** Children. **D.** Road runners
6. Weather forecasting information helps farmers to _____
   A. protect crops from weather hazards. **B.** play football.
   C. dig mining shafts. **D.** close holes in the fields.
7. Why do farmers construct large dams?
   A. To control insect pests. **B.** To construct houses.
   C. To practice irrigation. **D.** To dip their cattle.

Test 2

Paper 1: Multiple Choice Questions

There are 50 multiple-choice questions and you are required to answer all.

1. A magnetic material is a _____.
   A. metal that repels other metals
   B. metal that attracts other metals
   C. metal that repels and repels other metals
   D. a substance that attracts nonmagnetic materials
2. Which one is a metal?
   A. Iodine B. Palladium C. Phosphorus D. Oxygen
3. _____ is made of a non-metal.
   A. Machine parts B. Jewellery C. Crockery D. Cutlery
4. Which one is not ductile?
   A. Iron B. Carbon C. Copper D. Nickel
5. A _____ is a garden tool.
   A. Pin B. Hammer C. Spoon D. Watering can
6. Tools serve the purpose of _____.
   A. saving time B. attractiveness C. damaging goods D. poor performance
7. What is a mechanical structure?
   A. Interconnected assembled pieces of a tool or machine.
   B. Complex tools.
   C. A modelled tool.
   D. An attractive machine.
8. What is the name of the machine shown in the diagram below?

   A. CT scanner B. Gamma knife C. Infrared D. Ultraviolet rays
9. The area in which materials can be attracted to a magnet is a _____.
   A. magnetic field B. magnetic material
   C. magnetic field line D. magnetic force
10. _____ is not a source of electromagnetic radiation.
    A. The earth B. Water C. The sun D. A star

48. A wheelbarrow is an example of a _____.
    A. lever B. axle C. pulley D. gear
49. Which one of the following is an element of design?
    A. Contrast B. Emphasis C. Unity D. Space
50. A _____ is an example of a screw.
    A. jar lid B. see-saw C. axe D. pliers

Paper 2: Structured Questions

Section A

Section A with approximately 30 questions is compulsory and carries 30 marks.

1. (a) Define the following terms:
   (i) Metal. [1]
   (ii) Insulator. [1]
   (b) Name any two non-metal elements. [1]
   (c) Which are the types of materials that can be produced by metal? [2]

2. (a) What is a tool? [1]
   (b) Give any two examples of tools. [2]
   (c) Why do we need tools for? [2]

3. (a) Name any one material that is used to design a model of a mechanical structure. [1]
   (b) What are the problems one can encounter when using tools? [2]
   (c) How do you address the problems mentioned in (a). [2]

4. (a) Explain how sound travels in the air. [1]
   (b) What is sound energy? [1]
   (c) Give examples of materials that can make sound. [1]

5. (a) Define energy. [1]
   (b) Wood is converted to _____ and _____ energy. [2]
   (c) Draw and label a diagram showing the conversion of energy from one form to another. [2]

6. (a) A veld fire is _____. [1]
   (b) What are the causes of veld fires? [2]
   (c) How do you control a veld fire? [2]

Unit 18 SOIL

Unit Objectives

At the end of this unit, you will be able to:

(a) describe the weathering process.
(b) explain the effects of weathering.
(c) demonstrate the process of weathering.
(d) describe the cross section of the soil profile.
(e) construct a miniature soil profile.

Looking Back

In Grade 6 you learnt about soil erosion and soil conservation. Have you wondered where the soil comes from, or how it is formed? In this unit, you are going to learn about the process of weathering and the soil profile.

Key Words

Abrasion – the process of rubbing of rock particles against each other resulting in them wearing away.
Disintegration – breaking down.
Horizon – layers in a soil profile.
Soil profile – the vertical section through the soil from the ground level to the rock below.
Weathering – the breaking down of rocks into smaller particles to form soil.

Weathering process

Soil is formed from the disintegration (breaking down) of different rocks into smaller particles by the action of physical, chemical and biological processes. These small particles of rocks become soil. Therefore, soil is a product of weathering, a process by which rocks disintegrate into smaller particles in situ (at the same place).

Various types of rocks are available in Zimbabwe. Can you name the types of these rocks? These rocks are weathered into small particles to form different types of soil.

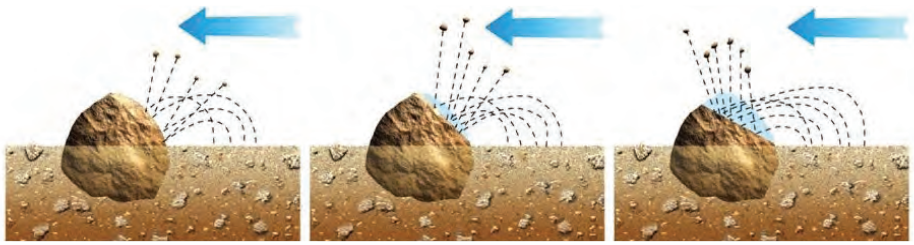
Agents of weathering

Agents of weathering are those factors which are responsible for weathering to occur. The agents of weathering include running water, wind, freezing water, plant roots, temperature changes, animals and microorganisms.

Running water: it causes small rock particles to rub against each other (abrasion) resulting in them breaking down into smaller particles to form soil.

Water abrasion

Wind: just like running water, wind carries some rock particles and causes abrasion.



Wind abrasion

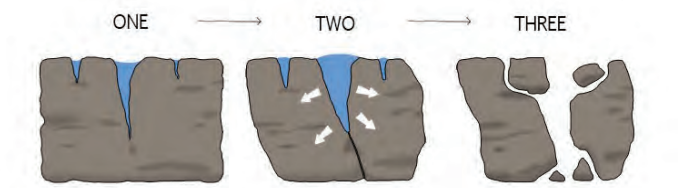
Freeze thaw

Freeze-thaw weathering is a process of erosion that happens in cold areas where ice forms. A crack in a rock can fill with water which then freezes as the temperature drops.

As the ice expands, it pushes the crack apart, making it larger. When the temperature rises again, the ice melts, and the water fills the newer parts of the crack.

The water freezes again as the temperature falls, and the expansion of the ice causes further expansion to the crack. This process continues until the rock breaks.

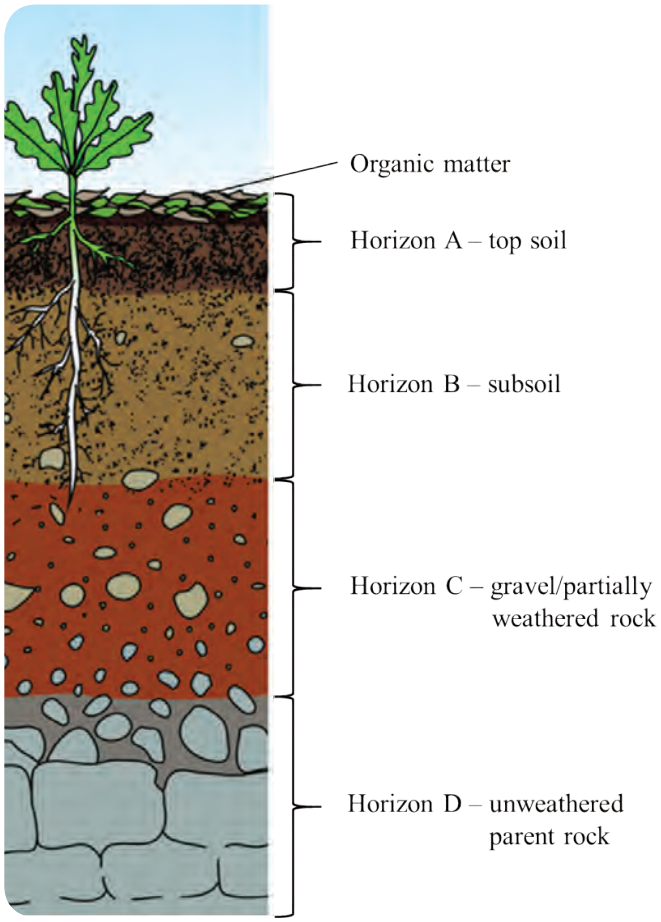
Temperature changes: when temperatures are very high especially during the day and very low during the night, the rocks expand and then contract. This results in the outer



Frost shattering/freeze-thaw action

Exfoliation/thermal shattering

Generally, the soil profile has four horizons; A, B, C and D. These horizons are shown in the diagram below.



The soil profile

The table below summarises the characteristic features of the soil profile horizons.

Horizon	Features
A (topsoil)	• Dark in colour due to the presence of organic matter (humus). • More plant nutrients and water required by plants. • Most plant roots are found in this horizon. • Has the most biological activities. • Its properties are highly affected by farming activities carried out on the soil.
B (subsoil)	• Lighter than Horizon A in colour due to less organic matter. • Has less plant nutrients and water for use by plants. • Fewer plant roots are found. • Has less biological activities than Horizon A. • Nutrients leached from horizon A are deposited in this horizon. • There is less disturbance of the soil through tillage.

- The soil profile has 4 horizons: A (top soil), B (subsoil), C (gravel or partly weathered rocks) and D (unweathered parent rock).
- The knowledge of the soil profile helps farmers in choosing the correct types of crops to grow.

Unit Revision Exercises

Multiple Choice Questions

1. The disintegration of rocks into small particles is called _____.
   A. erosion **B.** pollution **C.** weathering **D.** sedimentation
2. The following are agents of weathering except _____.
   A. water **B.** plant roots **C.** soil **D.** wind
3. Which agent of weathering could have caused what is seen on the picture below?

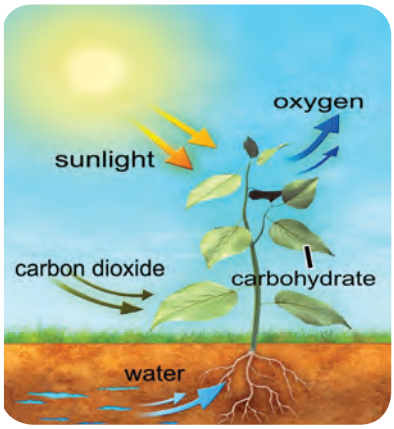
   A. Microorganisms **B.** Animals **C.** Wind **D.** Temperature changes
4. The vertical section through the soil is called _____.
   A. soil structure **B.** soil pH **C.** soil erosion **D.** soil profile
5. Which soil horizon has many plant roots?
   A. Horizon A **B.** Horizon B **C.** Horizon C **D.** Horizon D

Structured Questions

1. Explain how soil is formed.
2. State any three agents of weathering.
3. Explain what is happening on the diagram below.

4. (a) Define soil profile.
   (b) What is soil horizon?
5. Outline any two characteristic features of the topsoil (horizon A).
6. Suggest reasons why the topsoil is dark coloured.

Plants make their own food through the process of photosynthesis. Look at the diagram below, it illustrates the process of photosynthesis.



Photosynthesis is a process by which green plants make their own food from carbon dioxide and water in the presence of sunlight and chlorophyll. Chlorophyll is a green pigment found in the leaves. Its function is to absorb sunlight.

Conditions necessary for photosynthesis

Certain conditions are necessary for the process of photosynthesis to occur. These conditions are also called requirements of photosynthesis. Without any of these conditions, photosynthesis cannot take place. From the diagram above, the conditions necessary for photosynthesis are:

- carbon dioxide.
- water.
- sunlight.
- chlorophyll.

When photosynthesis has taken place, two products are formed. The products of photosynthesis are:

- carbohydrate.
- oxygen.

Word equation for photosynthesis

The process of photosynthesis can be illustrated by a word equation. This equation shows the conditions necessary for photosynthesis on the left side and the products of photosynthesis on the right side. The word equation for photosynthesis is written as follows:

$$\textit{Carbon} + \textit{Water} \xrightarrow[\textit{Chlorophyll}]{\textit{Sunlight}} \textit{Carbohydrate} + \textit{Oxygen}$$

Testing a leaf for starch

To show that photosynthesis has taken place, the plant should have carbohydrate. This carbohydrate can be stored in the leaves as starch. You need to carry out an experiment to show the presence of starch in a green leaf. Do an experiment on Activity 1.

Activity 1

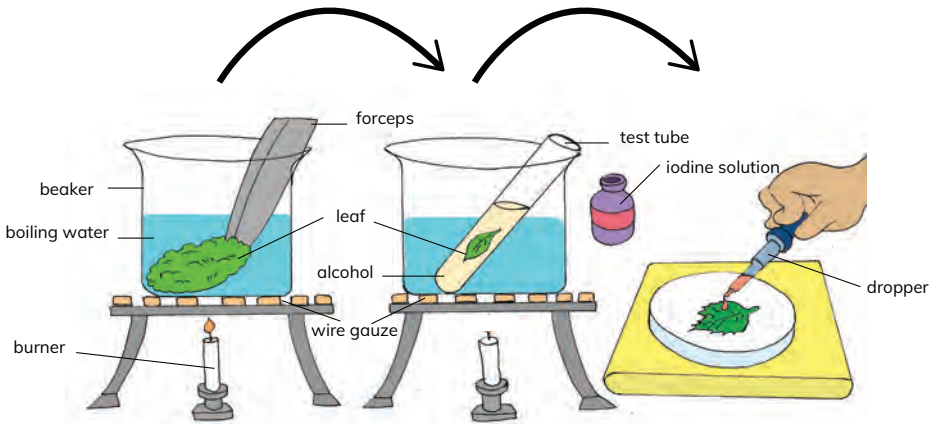
An experiment to show the presence of starch in a leaf

Materials needed: Green leaf, burner, water, alcohol/methylated spirit, forceps, white tile, iodine solution, dropper, beaker, test tube and clock/watch.

NB: You need to do this experiment in groups of six.

Method/Procedure:

1. *Set up the experiment as shown on the picture below:*



2. *Boil the green leaf in water for 2 minutes to kill and soften it.*
3. *Use forceps to remove the leaf from the hot water and boil in alcohol/methylated spirit to remove chlorophyll.*

Safety precaution: *Do not heat the test tube with alcohol in direct heat as alcohol is highly inflammable.*

4. *Dip the leaf in hot water again to soften it as alcohol makes the leaf brittle.*
5. *Spread the leaf on a white tile or any white surface and add a few drops of brown iodine solution using a dropper.*
6. *Observe the colour of the leaf and record your observations in a notebook. Compare your results with other groups.*

Expected results

The leaf will turn blue-black. This shows that starch (carbohydrate) is present in the leaf. This indicates that photosynthesis had taken place in the plant from which the leaf was taken.

Exercise 1

1. What is photosynthesis?
2. The green pigment found in plant leaves is called _____.
3. List any two conditions necessary for photosynthesis.
4. _____ is a form of carbohydrate stored in plant leaves and other plant parts.
5. If starch is present in a leaf, the leaf turns _____ colour after putting a few drops of iodine solution.

Classification of plants according to their uses

Plants have many different uses. Can you list the different uses of plants? Plants can be classified according to their different uses. The following are the classes of plants based on their uses:

1. Medicinal plants

Aloe vera plants

These are plants from which medicines are extracted. They are also called medicinal herbs. Examples of medicinal plants are *Aloe vera (gavakava)*, dandelion, moringa and lavender.

2. Cereal plants

Rice plant

Wheat

Maize

Wheat

These are plants whose seeds are used for food, for example, wheat, rice, maize, sorghum, oats and barley.

3. Ornamental plants

Ornamental plants

These are plants used for decoration or aesthetic value. This includes the beautification of an area or landscape. Examples of ornamental plants are flowers (roses, chrysanthemums, flame lily, marigold), lawns (Kikuyu, Australian Evergreen) and shrubs (duranta).

Unit

21 LANDFORMS AND MAPS

Unit Objectives

At the end of this unit, you should be able to:

(a) interpret landform features on a map through contour lines.
(b) deduce required direction on a map from a given point.
(c) measure lengths on maps and use them to calculate actual distances.
(d) locate a place using lines of longitude and latitude.
(e) recognise grid references as actual partitions of the map.
(f) describe a suitable scale to construct a map model.
(g) construct a map model.

Looking Back

In the previous grade, you learnt how to identify features of a map such as date, orientation, grid, symbol, scale, title, author, index, legend and sources. You also learnt how to draw a sketch map of the local environment showing various landforms. Discuss with your group members what you remember about each feature of maps.

Key Words

Convectional symbols – map symbols that have a common meaning all over the world.
Grids – set of crossing lines that create squares or rectangles.
Map reading – interpreting information presented on a map.
Latitudes – horizontal lines running from east to west on a map which help to determine precise location of a landform on a map.
Longitudes – vertical lines running from north to south on a map which help to determine precise location of a landform on a map.

Map reading

Map reading is interpreting information on the map which is represented by contour lines, direction, scale and conventional symbols in order to understand boundaries of an area, its location, its size and various landforms found within that area.

Colours are often used as symbols, for example, green is often used for forest, tan for deserts, and blue for water. The table below shows some of the conventional symbols that are useful in map reading.

Feature	Symbol
Road	
Railway	
Boundary	
Town	
Height	
Dam	
Mine	

Feature	Symbol
River	
Lake	
Bridge	
Church	
Contour lines	
House	

Exercise 1

1. What is map reading?
   A. Interpreting information on a map **B.** Reading words on a map
   C. Collecting information on a map **D.** Finding out how maps are made
2. Circles that show relief in a map are _____.
   A. conventional symbols **B.** direction
   C. contour lines **D.** scales
3. A black dot on a map is a conventional symbol that represents a _____.
   A. bridge **B.** building **C.** river **D.** town
4. On a map, what can help you to know the actual distance of an area?
   A. Roads **B.** Railway line **C.** Scale **D.** Relief
5. A conventional symbol on a map is used _____.
   A. nationally **B.** regionally **C.** provincially **D.** internationally
6. There are _____ main cardinal points.
   A. two **B.** three **C.** four **D.** five

Grid reference system

1. Longitudes and Latitudes

A grid is a set of squares or rectangles created by vertical and horizontal lines. The vertical lines run from the north to the south. They are called longitude lines or longitudes. The horizontal lines run from the east to the west. They are called latitude lines or latitudes. The grid reference system is a mechanism by which locations are determined using longitude and

- Which features of a map do you need to include in your map, for example, a key, title, date and your name as the author of the map.
- Which materials will be suitable for making your map model?

School map

Activity 2

1. *Draw or model a map of your school showing all the physical features in your school. These may include buildings, trees, sports fields, roads, paths, hills, depressions and any other that may be available like tanks and swimming pools.*
2. *Ensure that all the features of a map are included.*

Exercise 2

1. Two types of lines on a grid reference system are _____ and _____.
2. What is a four-figure grid reference?
3. Why is a four-figure grid reference important?
4. Which lines are read from the left on a grid reference?
5. Name any four features of a map.
6. Which cardinal point may be used alone in a map?

Key points in this unit

- High and low landform features such hills and basins can be interpreted through contour lines.
- Knowing the north on a map helps you to find the other cardinal points.
- Scale can be used to represent the actual size of a map.

Activity 1

1. *Discuss the uses of waste in your school.*
2. *Demonstrate how to separate waste into biodegradable and non-biodegradable waste.*

Exercise 1

1. What is manure used for?
2. What is molasses?
3. Give two uses of molasses.
4. Name two gases in biogas.
5. Give one example of solid fuel.
6. State one benefit of using solid fuel.

Impact of waste on the environment

When waste is not well managed, it causes problems for plants and animals in the environment. Some of the problems include outbreaks of diseases, pollution of air, water sources and land, climate change and eutrophication.

(a) Diseases

There are many diseases that can arise from poor waste management. The table below shows diseases caused by waste.

Waste	**Diseases caused by waste**
Sewage	Cholera, typhoid fever, diarrhoea and dysentery.
Food leftovers	Food leftovers invite pests such as house flies and cockroaches; and rodents such as mice and rats. • House flies cause diseases such as diarrhoea, cholera, dysentery and typhoid fever. • A report from the World Health Organisation suggests that cockroaches are proven or suspected carriers of the organisms causing diarrhoea, dysentery, cholera, leprosy, plague, typhoid fever and viral diseases such as poliomyelitis. • Rats and mice carry several diseases whose symptoms may be diarrhoea, fever, abdominal pain. They can also trigger asthma attacks in people who are asthmatic.
Animal waste	Like sewage, animal waste may cause diarrhoea, dysentery, worm infestation and allergic reactions.
Industrial waste	Industrial waste such as chemicals can cause burns, skin conditions and cause the malfunction of internal organs such as liver, lungs and kidneys. Industrial waste such as gases causes respiratory diseases like tuberculosis.

(b) Pollution

Pollution is another effect of waste on the environment. Waste can pollute the air, land and water. Air pollution occurs mostly through combustion in factories which releases smokes and fumes into the atmosphere.

Air pollution

Land pollution occurs when people litter the environment with non-biodegradable materials such as plastic, metal cans, kaylites and glass. Water pollution occurs when water sources are contaminated with waste. Pollution results in diseases and death of people, animals and aquatic life.

(c) Climate change

Waste on the environment causes climate change. Climate change is the change of weather patterns over a long period of time. Global warming is a result of climate change and has resulted in the increase of temperature off the earth.

The burning of fossil fuels such as coal for the purposes of generating energy releases gases into to atmosphere which form layers of carbon dioxide and greenhouse gases in the atmosphere.

Drought caused by high temperatures

Global warming causes extreme weather conditions like excessive rains, temperatures and winds which result in hazards like floods, drought and acid rain. All these weather extremes result in destruction of property and loss of human, animal and plant life on land as well as aquatic animal and plant life.

(d) Eutrophication

Eutrophication at Lake Chivero

Eutrophication is the pollution of water bodies by depositing of waste nutrients which cause the rapid growth of aquatic plants.

The table below shows more information about eutrophication.

Where is the waste coming from?	What is the waste?	What is the waste causing?
Industries	Chemicals	• Excessive growth of aquatic plants and algae. • Death of aquatic animals such as fish. • Loss of a habitat for aquatic animals. • Reduced oxygen for aquatic animals to breathe. • Unsafe drinking water. • Disturbance of the water ecosystem.
Burst sewer pipes	Sewage	
Storm water runoff	Manure and fertilisers containing ammonia, phosphates and nitrates.	

Activity 2

1. *Discuss the effects of waste on the environment.*
2. *Carry out awareness campaigns on waste management at your school.*

Exercise 2

1. Sewage waste causes diseases such as _____.
   A. cancer **B.** typhoid fever **C.** flue **D.** AIDS
2. An example of a rodent is a _____.
   A. house fly **B.** mosquito **C.** cockroach **D.** rat
3. Manure is _____.
   A. animal waste **B.** industrial waste **C.** aquatic waste **D.** any waste
4. Which one of the following is biodegradable?
   A. Metal cans **B.** Paper **C.** Plastic **D.** Glass
5. Smokes and fumes from industrial waste cause diseases in the _____ system.
   A. skeletal **B.** respiratory **C.** reproductive **D.** gut
6. The process in which nutrients are added to water sources is called _____.
   A. pollution **B.** afforestation **C.** eutrophication **D.** global warming

Key points in this unit

- Waste can be used to save money by using it as manure, animal feed and an alternative for fuel.
- Waste can have severe effects such as diseases, pollution, climate change and eutrophication.

Test 3

Paper 1: Multiple Choice Questions

Answer ALL questions.

1. Which one of these is a requirement for gravitational force to take place?
   A. Force B. Repelling C. Gears D. Mass
2. Gravitational force does not apply to _____.
   A. tides B. force multipliers
   C. earth's rotation around the sun D. objects with mass
3. One example of a pulley system is a _____.
   A. tide B. shovel C. well D. clock
4. Another name for the pivot point in a lever is _____.
   A. fulcrum B. rope C. gear D. wheel
5. An example of a type of gear is _____.
   A. bottle opener B. flagpole C. elevator D. herringbone
6. Which state of matter can flow?
   A. Solid B. Liquid C. Gas D. Ice
7. An example of a basic machine used to slide an object is called _____.
   A. pulley B. inclined plane C. rip saw D. screw driver
8. An example of a man-made structure is a _____.
   A. ocean B. building C. mountain D. hill
9. An example of a nautural structure is a _____.
   A. bridge B. building C. sports stadium D. cave
10. The energy which comes from the sun is called _____.
    A. electric energy B. heat energy C. magnetic energy D. solar energy
11. The following are types of energy except _____.
    A. solar B. heat C. light D. water
12. When wood is burnt, it produces _____ energy.
    A. heat B. solar C. electric D. sound
13. The following are examples of non-renewable fuels except _____.
    A. petrol B. diesel C. coal D. hydropower energy
14. When fuels are burnt, they produce _____.
    A. oil B. energy C. water D. oil
15. In an electric circuit, a battery is also called a _____.
    A. current B. terminal C. cell D. bulb
16. The following are all wheels and axles except the _____.
    A. pulley B. merry-go-round C. hammer D. revolving door
17. An example of a wedge is a _____.
    A. knife B. bulb C. tap D. bolt
18. Which one of these is a three-dimensional object?
    A. Circle B. Trapezium C. Triangle D. Rectangular prism
19. A _____ is an example of an inclined plane.
    A. gear B. door knob C. ramp D. shovel