THE REPUBLIC OF UGANDA

Ministry of Education and Sports

HOME-STUDY LEARNING

SENIOR 1

BIOLOGY

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This material has been developed as a home-study intervention for schools during the lockdown caused by the COVID-19 pandemic to support continuity of learning.

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FOREWORD

Following the outbreak of the COVID-19 pandemic, government of Uganda closed all schools and other educational institutions to minimize the spread of the coronavirus. This has affected more than 36,314 primary schools, 3129 secondary schools, 430,778 teachers and 12,777,390 learners.

The COVID-19 outbreak and subsequent closure of all has had drastically impacted on learning especially curriculum coverage, loss of interest in education and learner readiness in case schools open. This could result in massive rates of learner dropouts due to unwanted pregnancies and lack of school fees among others.

To mitigate the impact of the pandemic on the education system in Uganda, the Ministry of Education and Sports (MoES) constituted a Sector Response Taskforce (SRT) to strengthen the sector's preparedness and response measures. The SRT and National Curriculum Development Centre developed print home-study materials, radio and television scripts for some selected subjects for all learners from Pre-Primary to Advanced Level. The materials will enhance continued learning and learning for progression during this period of the lockdown, and will still be relevant when schools resume.

The materials focused on critical competences in all subjects in the curricula to enable the learners to achieve without the teachers' guidance. Therefore effort should be made for all learners to access and use these materials during the lockdown. Similarly, teachers are advised to get these materials in order to plan appropriately for further learning when schools resume, while parents/guardians need to ensure that their children access copies of these materials and use them appropriately.
I recognise the effort of National Curriculum Development Centre in responding to this emergency through appropriate guidance and the timely development of these home study materials. I recommend them for use by all learners during the lockdown.

Alex Kakooza
Permanent Secretary
Ministry of Education and Sports

ACKNOWLEDGEMENTS

National Curriculum Development Centre (NCDC) would like to express its appreciation to all those who worked tirelessly towards the production of home–study materials for Pre-Primary, Primary and Secondary Levels of Education during the COVID-19 lockdown in Uganda.

The Centre appreciates the contribution from all those who guided the development of these materials to make sure they are of quality; Development partners - SESIL, Save the Children and UNICEF; all the Panel members of the various subjects; sister institutions - UNEB and DES for their valuable contributions.

NCDC takes the responsibility for any shortcomings that might be identified in this publication and welcomes suggestions for improvement. The comments and suggestions may be communicated to NCDC through P.O. Box 7002 Kampala or email admin@ncdc.go.ug or by visiting our website at http://ncdc.go.ug/node/13.

Grace K. Baguma
Director,
National Curriculum Development Centre

ABOUT THIS BOOKLET

Dear learner, you are welcome to this home-study package. This content focuses on critical competences in the syllabus.

The content is organised into lesson units. Each unit has lesson activities, summary notes and assessment activities. Some lessons have projects that you need to carry out at home during this period. You are free to use other reference materials to get more information for specific topics.

Seek guidance from people at home who are knowledgeable to clarify in case of a challenge. The knowledge you can acquire from this content can be supplemented with other learning options that may be offered on radio, television, newspaper learning programmes. More learning materials can also be accessed by visiting our website at www.ncdc.go.ug or ncdc-go-ug.digital/. You can access the website using an internet enabled computer or mobile phone.

We encourage you to present your work to your class teacher when schools resume so that your teacher is able to know what you learned during the time you have been away from school. This will form part of your assessment. Your teacher will also assess the assignments you will have done and do corrections where you might not have done it right.

The content has been developed with full awareness of the home learning environment without direct supervision of the teacher. The methods, examples and activities used in the materials have been carefully selected to facilitate continuity of learning.

You are therefore in charge of your own learning. You need to give yourself favourable time for learning. This material can as well be used beyond the home-study situation. Keep it for reference anytime.

Develop your learning timetable to ca ter for continuity of learning and other responsibilities given to you at home.

Enjoy learning

Term 1

TOPIC 1: CELLS

Lesson 1: Specialised Cells

By the end of this lesson, you should be able to identify the features and functions of different specialised cells.

Introduction

From your previous studies, you learnt that all living organisms carry out life processes like growth, nutrition, reproduction e.t.c. You also found out that cells are the basic units of living organism. Most of the cells in the body of an organism carry out general functions like respiration, growth and excretion. However, **specialised cells** are modified in structure to perform specific functions.

In your body, different life processes take place, such as nutrition, reproduction and respiration.For the life processes to be performed, specialised cells are required.

Activity 1: identifying the features and functions of specialised cells

Study tables 1, 2 and 3 below.

Table 1 shows some features/structures of specialised cells

Table 2 shows the functions of specialised cells.

Table 3 below shows different types of specialised cells.

Use the information from Table 1 and Table 2 to complete Table 3 by filling in the blank spaces. Some parts of table 3 have been filled in for you.

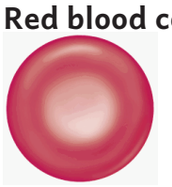
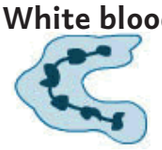
Table 1

Function of specialised cells
• Has a tail • Can change its shape • Has a regular shape with many chloroplasts • It is narrow and long providing a large surface area • Flat biconcave shape and no nucleus

Table 2

Function of specialised cells
• To trap much sunlight to enable the cell carry out photosynthesis • To penetrate soil and absorb water and mineral salts • To provide a large surface area to absorb and carry oxygen from the lungs to respiring cells • To engulf foreign particles and destroy them in order to defend the body • To propel/swim to the egg cell and fertilise it

Table 3

Specialised cell	Features/structures on specialised cell	Function of specialised cells
Sperm cell 		
Leaf cell 	Has a regular shape with many chloroplasts	
Red blood cell 		To provide a large surface area to absorb and carry oxygen from the lungs to respiring cells
Root cell 		
White blood cell 		

Lesson summary
Complete the lesson summary below. Select the correct word from the following list and use it to fill the blank spaces (features, red blood, functions, leaf).

Living organisms have specialised cells for example, _____ cells in animals and _____cells in plants. The specialised cells are different from non-specialised cells in a way that they have special _____ that enable them to carry out specific _____.

Lesson 2: Levels of Cell Organization

By the end of this lesson, you should be able to identify some tissues, organs and systems in the human body.

Introduction

Multicellular organisms are made up of many cells. In order for their bodies to function properly, there have to be many different types of cells performing different functions. The cells are organised into groups to make them work more effectively.

- *A group of **similar cells** performing a particular function is a **tissue** e.g. muscle tissue*
- *A group of **different tissues** form an **organ** to perform a particular function e.g. heart*
- *A group of **different organs** form an **organ system** to perform a particular function e.g. circulatory system*
- *A group of **different organ systems** form an **organism** e.g. a human*

Cell organisation at various levels carries out specific functions and key life processes in the body. This ensures efficient functioning of the body for the survival of the organism.

Activity 2: Identifying the tissues in your arm

Have you ever thought about what makes up your arm?

Stretch out your arm in front of you.

What are the possible internal and external parts of your arm right from the shoulder to the finger tips?

Think about and identify the tissues in your arm based on their function. Complete Table 3 below by writing down the parts of your arm based on their function.

Table 4

No.	Function of tissue	Parts of the arm
1.	Protection	
2.	Sensitivity (Response to stimuli)	
3.	Movement	
4.	Transport of materials	
5.	Excretion (removal of waste products)	
6	Support	

The tissues (parts) of your arm that you have written down form part of the following systems within your body.

i) Skeletal system
ii) Circulatory system
iii) Nervous system
iv) Excretory system

Complete the following paragraph by filling the blank spaces. Choose the words/ statements to use from the following: *sweating, bone, protection, skin, cartilage, blood, transport*, *response to stimuli, nerves, support* (Some of the words can be used more than once)

The skeletal system is made up of _____ and _____ tissue. The function of the skeletal system is for _____. The circulatory system consists of _____ tissue. The circulatory system has several functions that include _____ and _____. The nervous system consists of _____and _____. Its function is _____. Lastly, the excretory system in the arm consists of _____ whose function is _____.

Remember we were only looking at the tissues and systems in your arm. But these systems are made up on many more tissues and organs spread all over the body.

Lesson summary

Complete the lesson summary below. Select the correct word from the following list and use it to fill the blank spaces (function, systems, cells, organs).

Cells in multicellular organisms are organised in groups to carry out/perform specific functions. A whole/entire organism in made up of different _____. Each system consists of _____ working together. An organ is made of tissues performing the same _____.

A tissue is a group of _____ working together.

TOPIC 2: CLASSIFICATION

Lesson 1:Flow Charts for Biological Classification

By the end of this lesson, you should be able to use a flow chart to identify organisms based on their characteristics.

Introduction

There are millions of living organisms. Studying all of them is only possible if the organisms are grouped rather than analysing them as individual organisms. The living organisms are placed in groups basing on their similarities and differences. Biologists put living things into groups of related organisms. This is called **classification.**

Classification *is putting together organisms which have similar structure, and separating them from those which are different in structure.*

All living organisms are arranged in groups or levels called **taxa**. Taxa is a plural of **taxon** which originates from the word **taxonomy. Taxonomy** refers to the study of classification. There are seven taxonomic levels that are arranged in the following order starting from the largest to the smallest i.e. Kingdom, Phylum, Class, Order, Family, Genus and Species.

Species: This is a group of organisms with similar characteristics that are able to breed freely among themselves and produce fertile offspring. This is a taxon/group with the fewest organisms.

Genus: This group consists of a number of similar or closely related species.

Family: This group is made up of closely related genera (genus-singular).

Order: This group is made up of closely related families.

Class: This group is made up of closely related orders.

Phylum: This group is made up of closely related classes.

Kingdom: This is the highest category into which organisms are classified. It consists of organisms belonging to closely related phyla (phylum-singular). This group contains the highest number of organisms.

Example: The table shows the taxonomic levels for the classification of a human being and that of a cow.

	Human	Cow
Kingdom	Animalia	Animalia
Phylum	Chordata	Chordata
Class	Mammalia	Mammalia
Order	Primata	Atriodactyla
Family	Hominidae	Bovidae
Genus	*Homo*	*Bos*
Species	*sapiens*	*taurus*

Flow Chart for Biological Classification

We can use a flow chart to classify/identify organisms basing on their features/characteristics. The chart usually begins with two distinct features/characteristics that distinguish a group of organisms. Then other features/characteristics can be used to further separate the organisms until each individual in the group is identified independently. Take a look at the chart below and try to figure out the domestic animals based on their characteristics.

Activity 1 : Using a flow chart to identify domestic animals

Study the flow chart shown below and use to identify domestic animals A, B, C, D and E.

1. Which one of the domestic animals is a?
   i) duck
   ii) cow
   iii) cock
   iv) dog
   v) pig
2. Using the domestic animals in (1) above, create your own flow chart but with features/characteristics different from those given above.

Lesson summary

Complete the lesson summary below. Select the correct word from the following list and use it to fill the blank spaces (classify, identified, flow, characteristics).

A _____ chart can be used to _____living organisms. The chart is created using the _____ of the organisms. In the chart, distinct characteristics are separated until each organism in a group is _____.

Lesson 2: Five Kingdoms of Living Organisms

By the end of this lesson, you should be able to mention the general characteristics, examples and importance of organisms in the five kingdoms.

Introduction

Kingdoms are a way that scientists have developed to group all living organisms. These groups are based on the characteristics living organisms have in common and how they differ. The characteristics that can be used to group living organisms include;

a) the presence or absence of a membrane around the cell nucleus.

b) number of body cells; unicellular organisms have one cell while multicellular organisms have many cells.

c) the type of nutrition used by the organism; autotrophic organisms can manufacture their own food while heterotrophic organisms obtain food from other organisms.

There are five kingdoms in which all living organisms are grouped:

1. Kingdom Monera
2. Kingdom Protoctista
3. Kingdom Fungi
4. Kingdom Plantae
5. Kingdom Animalia

Activity 2: Finding out the general characteristics of organisms in the five kingdoms

1. Search different sources of information (textbooks, internet, community members) and complete Table 1 below by ticking in the appropriate box showing the general characteristics of the five kingdoms.

Lesson summary

Complete the lesson summary below. Select the correct word from the following list and use it to fill the blank spaces (monera, harmful, plantae, five, animalia, useful, cells, fungi, membrane, protoctista, nutrition).

All living organisms are grouped into _____ kingdoms namely; _____, _____, _____, _____ and _____. The key features used to place organisms in those kingdoms include; presence or absence of a _____ surrounding the nucleus, the number of _____ that make up the organism and its type of _____. Organisms in one kingdom can either be _____ or _____ to other organisms in different kingdoms.

Table 1

		Kingdo Monera	Kingdom Protoctista	Kingdom Fungi	Kingdom plantae	Kingdom animalia
Membrane around the nucleus	Yes					
	No					
Number of body cells	Organism made up of one cell (Unicellular)					
	Organism made up of many cells (Multicellular)					
Type of nutrition	Organism makes its own food (Autotrophic nutrition)					
	Organism feeds on already made food (Heterotrophic nutrition)					

2. Use the information from Table 4 to write down brief notes about each of the kingdoms. Include examples of organisms found in each of the kingdoms.
3. Using examples in Uganda, research one beneficial and one harmful application of organisms in each of the five kingdoms.

Lesson 3: Plant Kingdom

By the end of this lesson, you should be able to sort the pictures of plants according to the different groups to which they belong.

Introduction

Plants include trees, shrubs, ferns, mosses, and grasses. All plants are multi cellular, their cells have a nucleus surrounded by a nuclear membrane, and the cells are surrounded by a cellulose cell wall. Their cells contain a green pigment known as chlorophyll that traps sunlight which the plant uses to make its own food (photosynthesis). Plants are placed in the following groups

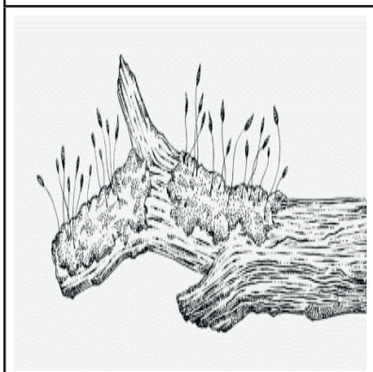
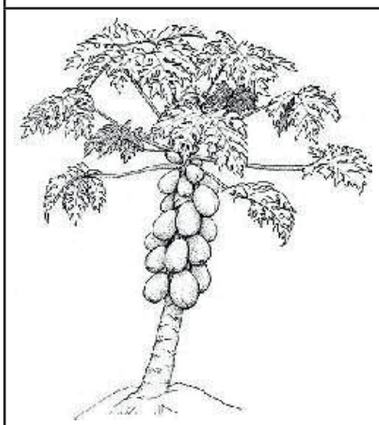
1. Bryophytes e.g. mosses, liverworts and hornworts. They are small plants that commonly inhabit shady moist places. The bear stem and leaf-like structures but no roots. They have no vessels and no flowers.

2. Pteridophytes e.g. ferns. They grow in damp shady places. They bear stems, leaves and roots. They have vessels and do not bear flowers.

3. Spermatophytes e.g. trees, shrubs and herbs. These are plants that bear seeds. They have a stem, leaves, roots and well-developed vessels.

Activity 3: Grouping plants
Study the pictures of plants in the table below.

Determine which group each plant belongs (bryophyte, pteridophyte or spermatophyte) and write it in the table. Give a reason(s) why you have placed the plant in that group

Picture of plant	Group name **(Bryophyte, Pteridophyte or Spermatophyte)**	Reason(s)
		
		
		

		
		
 Sorghum. Turky Millet.		

Lesson 4: Vertebrates (Chordata)

By the end of this lesson, you should be able to mention the characteristics of the different classes of vertebrates and use a key to identify different mammals

Table 2: Descriptions of characteristics used to identify vertebrates

Characteristic	Description
Skin	• Skin with no scales • Skin covered with scales • Skin covered with feathers • Skin covered with fur/hair
Habitat	• Live in water (aquatic) • Live on land (terrestrial)
Teeth	• Have the same type of teeth • Have different types of teeth • Have a beak
Eggs	• Do not lay eggs • Lays eggs with soft shells • Lays eggs with hard shells
Temperature regulation	• Body temperature is constant and is regulated internally (Endothermic) • Body temperature changes according to the temperature of the external environment (Ectothermic)
Reproduction	• Fertilization takes place internally • Fertilization takes place externally
Gas exchange structures	• Uses gills • Uses lungs • Uses the skin
Limbs	• Have arms • Have legs • Have fins • Have wings

Use Table 2 above to fill in Table 3 of vertebrates below. Examples of the different vertebrates have been included to guide you.

Table 3: Vertebrates

		Phylum Chordata				
		Class Pisces	**Class Amphibia**	**Class Reptilia**	**Class Aves**	**Class Mammalia**
Characteristic features	Skin					
	Habitat					
	Teeth					
	Eggs					
	Temperature regulation					
	Reproduction					
	Gas exchange structures					
	Limbs					
Examples		Tilapia, Nile perch,	Frogs, Toads	Tortoise, Python, Crocodile	Pigeon, Duck, Eagle	Goat, Buffalo, Gorilla

Introduction

The animal kingdom can be divided into two groups i.e.

1. Animals without a backbone (Invertebrates)
2. Animals with a backbone (Vertebrates)

In biological classification, vertebrates are placed in a group called **Phylum Chordata**. They have the following characteristics:

i) They have an endoskeleton
ii) They have a hollow nerve cord running along the length of the body.
iii) Their bodies consist of a head, trunk and usually a tail.
iv) They have two pairs of limbs (fins, wings, legs or arms) used for locomotion.

Phylum Chordata is made up of five classes; **Pisces, Amphibia, Reptilia, Aves** and **Mammalia.**

Activity 4: finding out the characteristics of the organisms in phylum chordata

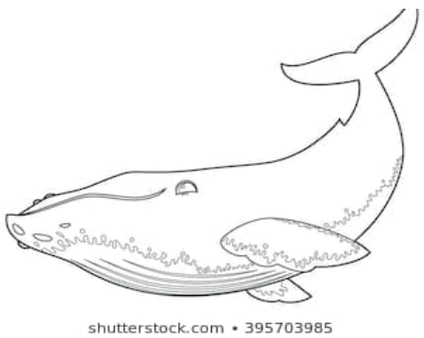
Study Table 2 showing descriptions of characteristics used to identify vertebrates.

Activity 5: Using *a* key to identify mammals

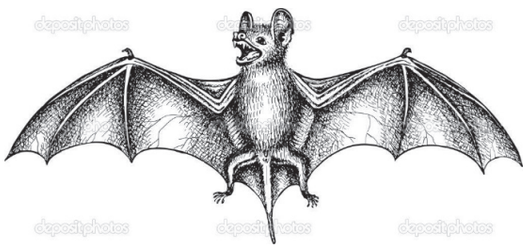
When you are trying to name mammals (or any other living organisms), *a* special table called *a* key can be very useful. The key is written in such *a* way that you compare two characteristics at *a* time to be able to eventually identify the different organisms. Because the key uses two comparisons, it is also refereed to as *a* DICHOTOMOUS key (Di – means two)

Below is *a* key which will help you identify some mammals. In order to use the key, you have to ask yourself some questions like "does the animal have fins?" does it have legs?" or "does it have wings?"

Study the pictures of mammals below and look out for the different characteristics



Mammal P



Mammal Q

Mammal R

Mammal S

Study the key below and use it to identify the mammals. Fill in the spaces in the key using the letters that represent the mammals

1 *a*) If the mammal has wings, it is mammal _____

b) But if the mammal has no wings, you got to 2

2 *a*) If the mammal has fins, it is mammal _____

b) If the mammal has no fins, you go to 3

3 *a*) If the mammal has *a* long narrow tail, it is mammal _____

b) If the mammal has *a* short bushy tail, it is mammal _____

Now you will replace the letters with the actual names of the mammals. Choose the name from the ones given in brackets (Monkey, Bat, Squirrel, Whale)

P is *a* _____

Q is *a* _____

R is *a* _____

S is *a* _____

Lesson summary
Complete the lesson summary below. Select the correct word from the following list and use it to fill the blank spaces (amphibia, live, backbone, dichotomous, aves, classes, eggs, environment, mammmalia, fish, birds).

The common characteristic of organisms in phylum chordata is that they have *a* _____. The organisms in this phylum are grouped into five _____ namely; pisces, _____, reptilia, _____ and mammalia. All organisms in these classes lay _____ except for organisms in class _____ which produce their young _____. The internal body temperature of mammals and _____ is constant while the internal temperature for reptiles, amphibians and _____ changes according to the external _____.

A _____ key can be used to identify organisms

TOPIC 3: INSECTS

Lesson:External features of insects

By the end of this lesson, you should be able to identify the features on common insects.

Introduction

Insects have for *a* long time been known as pollinators, honey producers, vectors, food and for beauty. All insects have *a* head, thorax and abdomen. These parts bear other structures that enable the insect to function normally and live well in its environment. Insects have *a* large role they play in the lives of humans, plants and other living organisms.

The insects that we interact with regularly are the housefly, cockroach, mosquito, worker bee, butterfly and soldier termite.

Activity 1: identifying the characteristics and importance of common insects

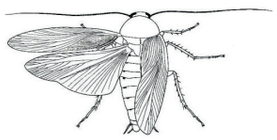
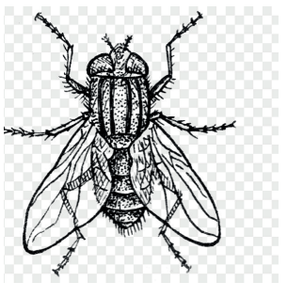
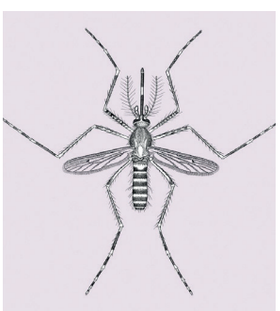
Part 1

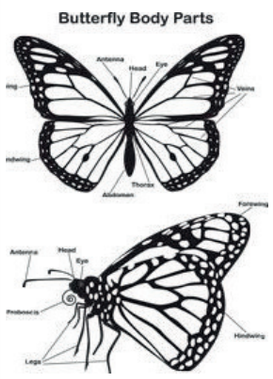
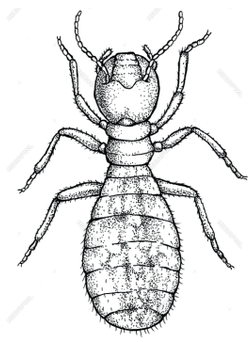
Search in your house or in the surrounding environment for the following insects; an adult cockroach, housefly, mosquito, worker bee, butterfly and termite. Trap the insect (you can use insecticide/nets) and kill it without destroying its parts.

Caution: Some insects can bite or sting you so be very careful when trapping them. Ask an adult to help you wherever necessary.

Observe the features of the antennae, eyes, wings and legs of the insects provided. Describe the features in Table 1 below.

Table 1: Features of insects

Insect	**Description**								
	Antennae		**Eyes**		**Wings**		**Legs**		
Cockroach 	*Number*		*Number*		*Number*		*Number*		
	Length and shape		*Type*		*Texture*		*Texture*		
	Texture								
Housefly 	*Number*		*Number*		*Number*		*Number*		
	Length and shape		*Type*		*Texture*		*Texture*		
	Texture								
Mosquito 	*Number*		*Number*		*Number*		*Number*		
	Length and shape		*Type*		*Texture*		*Texture*		
	Texture								

Worker bee 	*Number*		*Number*		*Number*		*Number*	
	Length and shape		*Type*		*Texture*		*Texture*	
	Texture							
Butterfly 	*Number*		*Number*		*Number*		*Number*	
	Length and shape		*Type*		*Texture*		*Texture*	
	Texture							
Termite 	*Number*		*Number*		*Number*		*Number*	
	Length and shape		*Type*		*Texture*		*Texture*	
	Texture							

Caution: After completing the activity, WASH your hands thoroughly with CLEAN WATER and SOAP.

1. (a) What is the function of antennae to an insect?

   (b) Among the insects provided, which do you think has antennae that are specifically adapted to its way of life? Give reasons for your answer.

2. Did all the insects have eyes? If not, which insect did not have eyes? Suggest a reason for your answer.

3. What are the legs and wings in insects used for?

4. Did all the insects have wings? If not, which one(s) did not have? Give a reason for your answer.

5. Was there an insect with more than one pair of wings? If yes, which one(s)? Suggest the functions of the wings observed.

6. (a) Which insects have special features on their legs?

   (b) What are those features? What are they used for?

Part 2

1. For each of the insects in Table 2 below, research and find out the following:

   a) How the insect is helpful to other organisms/the surroundings.

   b) How the insect is harmful to other organisms/the surroundings.

2. Fill in Table 2 (put into consideration the different stages of the lifecycles of these insects).

Table 2

Insect	How it is helpful	How it is harmful
Cockroach		
Housefly		
Mosquito		
Honey bee		
Butterfly		
Termite		

Lesson summary
Complete the lesson summary below. Select the correct word from the following list and use it to fill the blank spaces (six, houseflies, antennae, thorax, diseases, pollinate, head, three, cockroaches, bees, abdomen, butterflies).

The bodies of insects are made up of _____ distinct parts i.e. _____, thorax and _____. They have _____ legs attached to the _____. Insects have a pair of _____ that are sensitive to the surroundings. Insects are important to other organisms in a positive and negative way. Harmful insects include _____and _____ because they transmit _____. Useful insects include _____ and _____ because they _____ flowers.

TOPIC 4: FLOWERING PLANTS

Lesson 1: Parts of a Flowering Plant

By the end of this lesson, you should be able to distinguish between a monocotyledonous plant and a dicotyledonous plant.

Introduction

Flowering plants are made up of a ***root system*** and a ***shoot system***. The ***root system*** absorbs water and mineral nutrients from the soil. The ***shoot system*** is composed of the stem, leaves and flowers. The leaves specialise in making food while flowers are specialised in sexual reproduction. Both the root system and shoot system work together to enable flowering plants to survive mainly on land. The two systems are connected by vascular tissue (vessels) that run from the root through the shoot.

Activity 1 : Comparing the external features of dicotyledonous and monocotyledonous plants

Visit a nearby garden and identify a mature (fully grown) dicotyledonous plant e.g. a bean/cowpea/groundnut plant and a mature (fully grown) monocotyledonous plant e.g. maize/millet/sugarcane/sorghum plant.

Observe the identified plants carefully, and;

i) Draw and label the dicotyledonous plant and the monocotyledonous plant.
ii) State the functions of the parts you have labelled in (i) above.
iii) Compare the features of the plants and complete Table 1 below using the structural features.

Table 4.1

No.	Features	Dicotyledonous plant	Monocotyledonous plant
1.	Type of root system		
2.	Leaf venation		
3.	Leaf shape		
4.	Leaf attachment to stem		
5.	Flower appearance		

iv) From your observations, write down brief notes about the characteristics of:
- Dicotyledonous plants
- Monocotyledonous plants

Lesson summary
Complete the lesson summary below. Select the correct word from the following list and use it to fill the blank spaces (flowers, network, dull, dicotyledonous, fibrous).

Flowering plants can be grouped into two. i.e monocotyledonous and dicotyledonous plants.

_____ plants have a tap root system, _____ leaf venation and brightly coloured _____. Monocotyledonous plants have a _____root system, parallel leaf venation and _____ coloured flowers.

Lesson 2: Modified Plant Parts

By the end of this lesson, you should be able to identify modified plant parts and state their functions.

Introduction
The main parts of a plant include the roots, stems and leaves. Each of these parts has key functions for example, **roots** anchor the plant as well as absorb mineral nutrients and water from the soil.**Stems** conduct water, mineral salts and food through the plant. They also hold different plant parts (leaves, flowers and fruits) in position. **Leaves** make food for the plant.

Sometimes, however,different plant parts have special adaptations/modifications that enable them to carry out other extra functions.

Functions of modified plant parts include:

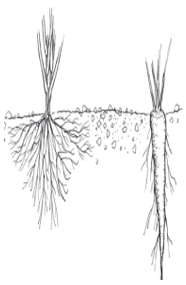
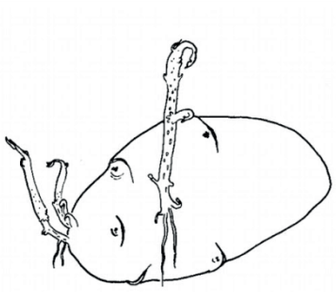
1. Storage of food and water
2. Vegetative reproduction
3. Support
4. Protection

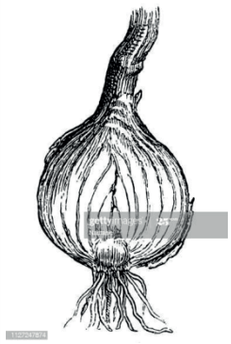
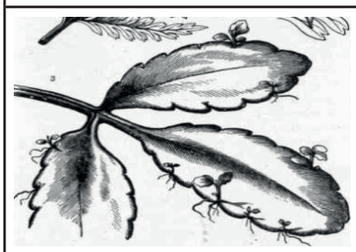
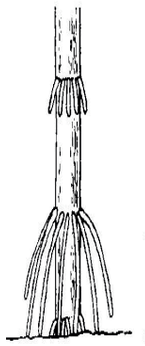
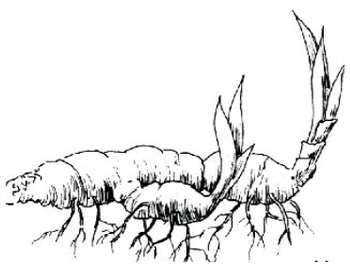
Activity 2: Finding out how plant parts are adapted to their functions
Observe carefully the pictures of plant parts in Table 4.2 below. Complete the Table by filling in the following information:

i) The part of the plant (leaf, stem or root)
ii) Special adaptation/modification
iii) Function of modified part
iv) Example of the plant

(Some sections of the table have been filled in to guide you)

Table 4.2

Picture	Part of plant (leaf, stem or root)	Adaptation/ modification	Function	Example
		Swollen		
				Sugarcane
				
			Protection	

Lesson summary
Complete the lesson summary below. Select the correct word from the following list and use it to fill the blank spaces (protection, reproduction, storage).

Some plants may have their leaves, stems or roots suited/modified/adapted to carry out an extra specific function. Plant parts that are swollen are usually modified for _____. Thorns and spikes on plant parts are for _____. Presence of buds indicate that a particular plant part can be used for _____.

Lesson 3: Leaves

By the end of this lesson, you should be able to identify the features/characteristics of some leaves and construct a dichotomous key for the leaves.

Introduction
Leaves are the main sites for photosynthesis. You may have learnt that photosynthesis is the process by which plants make food. Most leaves are usually green due to the presence of chlorophyll. Leaves are also sites for gaseous exchange and transpiration which take place mainly through the stomata.

Structure of leaves
A typical leaf consists of a lamina (the broad part of the leaf, also called the leaf blade) and a leaf stalk/petiole (the stalk attaches the leaf to a stem). A leaf also has a midrib, which stretches the length of the leaf and branches to each side to forming veins.

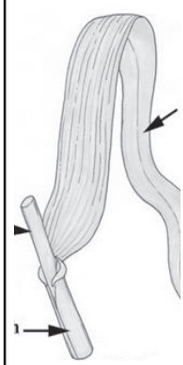
The arrangement of veins in a leaf is called the **venation.** In monocotyledonous plant leaves, the veins run in straight lines across the length of the leaf with-out converging at a point, hence they have **parallel** venation. In dicotyledonous plants, the veins of the leaf have a network-like appearance, forming a pattern known as **network venation**. The edge of the leaf is called the margin while the tip is called the apex.

The leaf blades/laminae of different leaves are not the same. Depending on the leaf blade, leaves may be simple or compound. In a **simple leaf**, the leaf blade is either completely undivided as in the banana leaf or it has lobes, but the separation does not reach the midrib, e.g. cassava leaf.

Activity 3: Classifying leaves

i) Study the table below showing the characteristics and pictures five of leaves. Complete the table by filling in /writing a statement to describe each leaf based on its structural characteristics

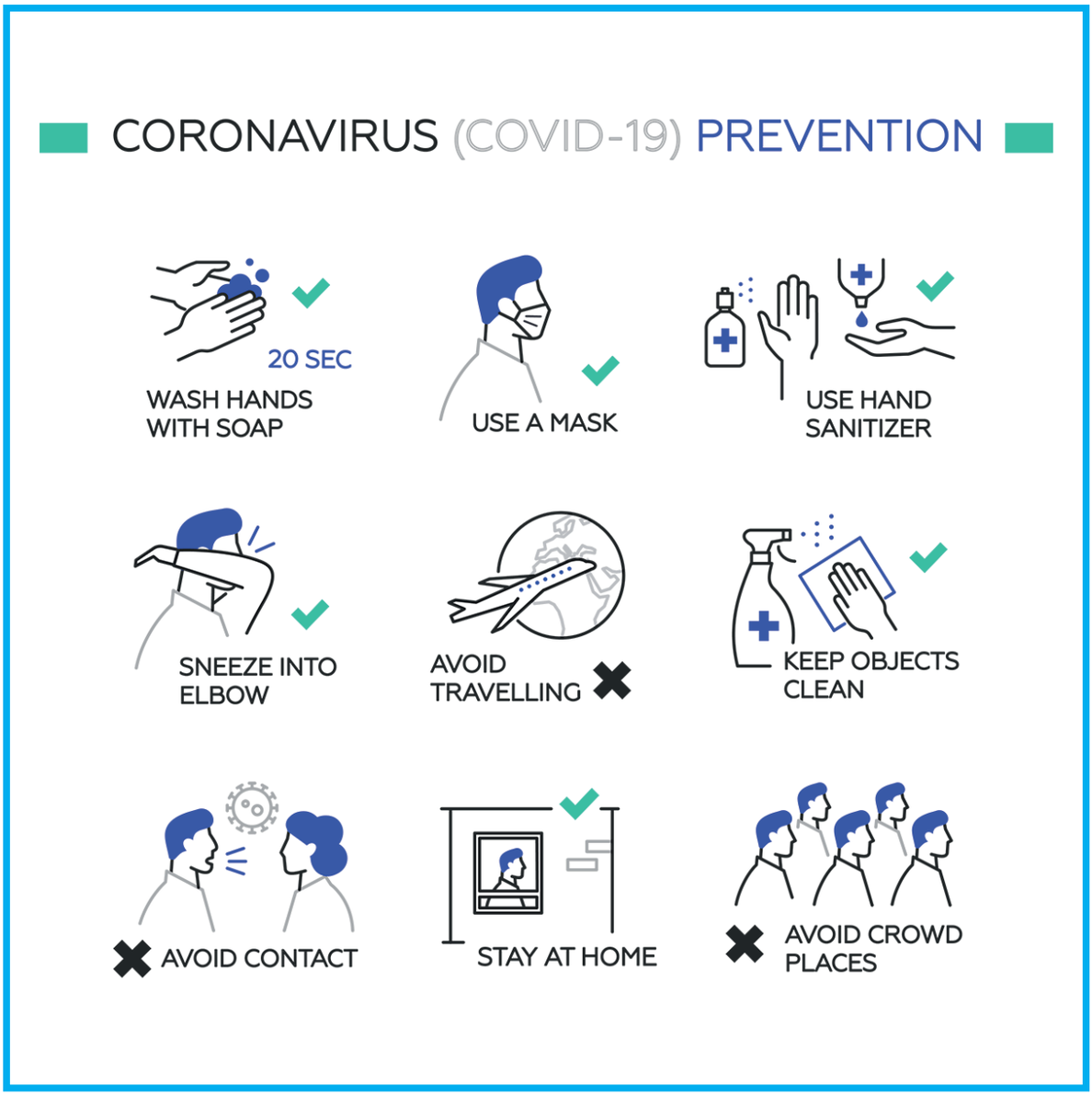
Table of Characteristics for Five Leaves

	Structural	SPECIMENS				
	characteristics					
1.	Leaflets/leaf lobes or not					
2.	If leaflets are present, state the number					
3.	Texture of lamina (hairy or non-hairy)					
4.	Type of venation (parallel or network)					
5.	Leaf margin (entire or toothed)					
6.	Leaf sheath or petiole (Present or absent)					
7.	Leaf shapes					

ii) Construct a dichotomous key for the leaves using the characteristics in the table

Lesson summary
Complete the lesson summary below. Select the correct word from the following list and use it to fill the blank spaces (parallel, blade, compound, network, food, divided, stalk).

Leaves are useful for the production of _____ in plants. A leaf_____ attaches the leaf to a branch or stem. The lamina or leaf _____ is the broad part of the leaf. The lamina in a simple leaf is not _____ while in a _____ leaf the lamina is divided. Leaves have two types of venation i.e _____ and _____.



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