S.1 Work book

BASED ON THE NEW CURRICULUM

New for 2022

With guide notes, practical, application qns, projects,

Field work, group activities and activities of integration

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Biology

LUMASA RICHARD

New curriculum work book for s.1

Biology

Student's information.

This book belongs to:

Name ……..

School ……

Class ……...

Stream ……

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For orders;

Tel; 0757998376

Tel; 0780492637

Email; richardlumasa@gmail.com

Whatsapp; 0757998376

First edition printed in 2022.

Contents

TERM 2

TERM 3

Chapter 4: Insects

New curriculum

Emphasis

- The new curriculum is a move from a knowledge based old curriculum to application of skills learnt in everyday life.
- Students are to interact with real life situations inside and outside the classroom.
- Students are find out knowledge for themselves and express it in their own words and understanding.

Biology change

- Biology has become more of application than in the old curriculum in that students are to carry out field works, investigations, group activities, exploration, generating problems and solving them using textbooks and internet under the guidance of a teacher.

Changes in coverage content for s.1 biology.

- Hand lenses and microscopes have been removed. They are to only be used to aid learning but are not supposed to be studied or drawn like in old curriculum.
- Internal structures of flowering plants have been moved to transport in plants.
- Describing stages of life cycles of insects has been moved to growth and development.
- Classification content has been reduced to cover only key groups of organisms and their characteristics.
- Feeding, excretion in amoeba have been removed
- The process of fertilization in flowering plants to be done only in reproduction.
- The general scope has been reduced to only cover key and applicable features.

Author's note.

Note 1. Seed dormancy and germination has not been included in this book because learners will study it in growth and development.

Note 2. Pollination in flowering plants has not been included in this book because learners will study it in reproduction in plants before they study double fertilization.

So seed dormancy, germination and pollination aren't included to prevent repetition.

CHAPTER 01

INTRODUCTION TO BIOLOGY

By the end of the chapter you should;

- **Be able to define biology and its branches**
- **Be able to relate biology with everyday life activities**
- **Be able to identify and define the life processes of living things**
- **Be able to explain the importance of life processes and how they differ in different organisms.**

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X

Z

Y

R

Occupation in X

……

How the knowledge of biology is applied. (Be brief just give in a sentence)

……..

……

Occupation in Y

……

How the knowledge of biology is applied. (Be brief just give in a sentence)

……

……

1.3 Life processes of living things.

These can also be called characteristics of living things. There are 7 characteristics common to all living things i.e. growth, reproduction, excretion, movement, respiration, sensibility and nutrition.

1. Growth

Is the permanent increase in the size of an organism by increasing in cell number, cell size or both.

Importance of growth to living organisms

- it enables organisms successfully survive to reproduce

2. Reproduction

Is the process where new individuals are produced from their parents

Importance of reproduction to living organisms

- it leads to increase in number of organisms
- it ensures continuity of organisms

3. Excretion

Is the removal of waste products of metabolism from organisms

Importance of excretion to living organisms

- it prevents accumulation of wastes which could be harmful to organisms
- it maintains the PH of body fluids of organisms

4. Respiration

Is the breakdown of food to release energy

Importance of respiration to living organisms

- it releases energy which is used for other processes like movement, cell division
- It produces heat thus enables warm blooded animals to stay warm even in cold environments.

5. Movement

Is an action by an organism or part of an organism causing a change in position or place.

Importance of movement to organisms

- Enables organisms to search for food and water
- Enables organisms to run away from their enemies

6. Sensibility (irritability)

Is the ability of organisms to detect and respond to stimuli

Activity 3. You are required to write a simple summary on whether a car is a living or a non-living thing using the one provided in the picture. Read the statement below provided on the features of a Lamborghini, brainstorm on them as a group and use them to write the report required.

"The picture below shows Lamborghini Aventador. It moves at a speed of 220 miles per hour. It consumes petrol which it burns to produce energy and then exhausts fumes and spits fire as the waste products. It has sensors which automatically control the levels of

oil, temperature and pressure."

QN. Write a simplified summary on how you would classify a Lamborghini car; either as a living thing or a non-living thing.

Your summary should include;

- Characteristics of living things possessed by a Lamborghini
- How a Lamborghini carries out the characteristics of living things
- Characteristics of living things a Lamborghini lacks
- How you would classify a Lamborghini (is it a living thing or not).
- Reason why you classify it as a living or non-living thing.

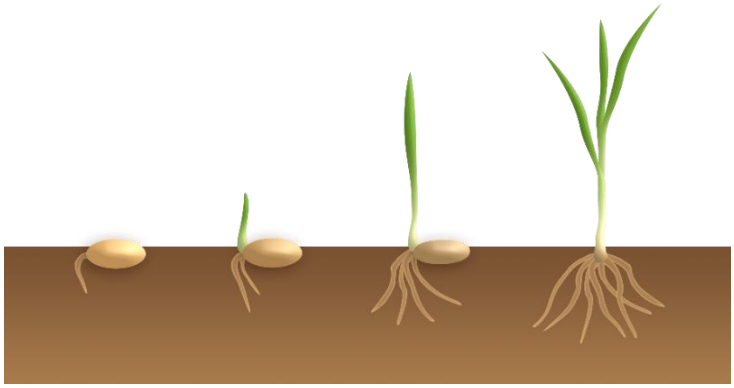
Be brief and specific. Don't exceed the one page provided.

Chapter 01 application questions.

For the application questions, students should answer them either in a group or individually and take the work to the teacher for marking, do corrections then present the qns and answers to their fellow students in class.

1. The pictures below show a particular life process in plants and animals. Use them to answer questions that follow.

Picture 1.



Picture 2.

a) Which life process is illustrated in the pictures above?

……..

b) Give two ways how the life process above is useful to;

b) Which branch of biology is occurring in the picture?

……

ii) Apart from that shown in the picture, state two other ways that branch of biology is used in everyday life.

……

……

c) Outline the importance of the structures in the picture to the community.

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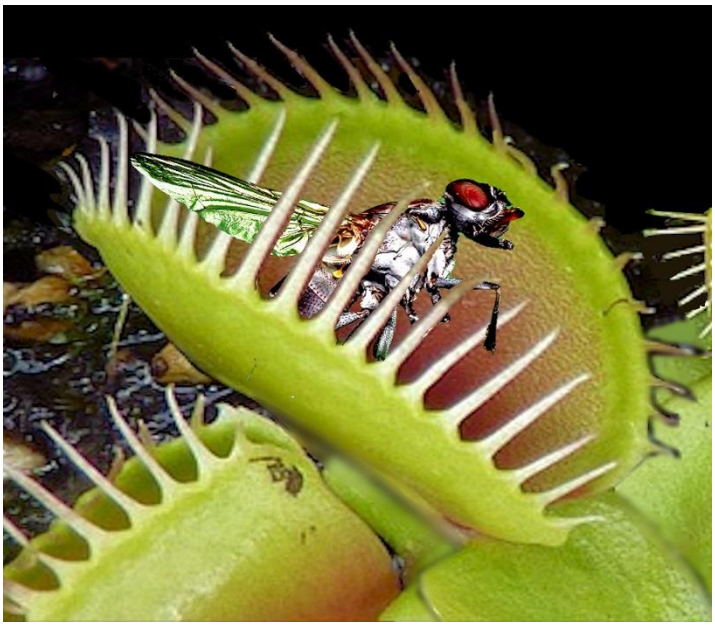
5. Study the picture below and use it to answer the questions that follow.



a) (i) What do you think is happening in the picture?

……

ii) Which branch of biology shows what is happening in the picture?

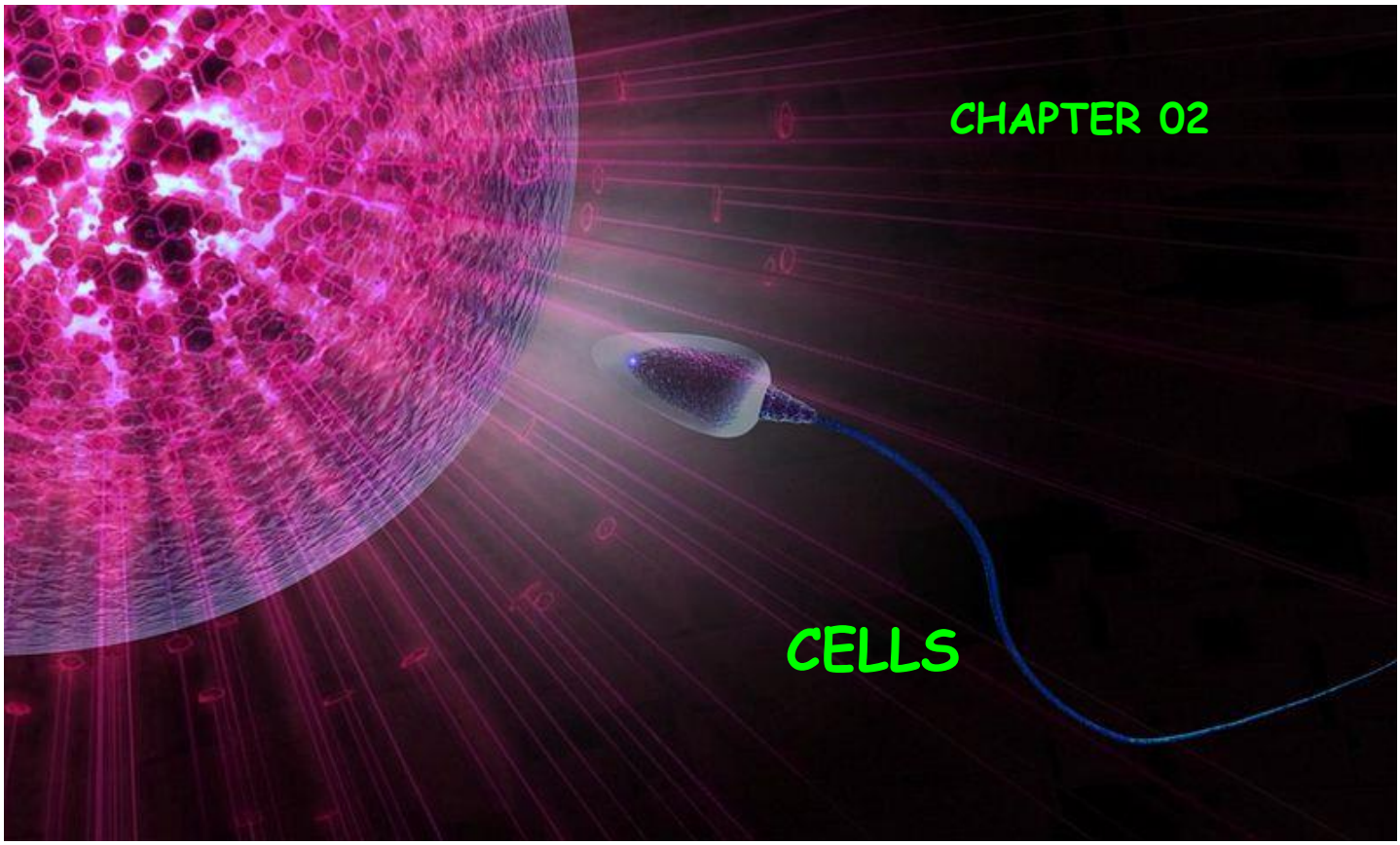
……

iii) Give a reason for your answer in (ii)

……

iv) Which life processes of living things is being portrayed by the plant? Give 2

……



By the end of the chapter you should;

- **Define a cell**
- **Identify parts of animal cell and plant cell with their function.**
- **Explain structures of specialized cells in relation to their function**
- **Distinguish levels of cellular organization.**
- **Apply the knowledge of cells to everyday life**

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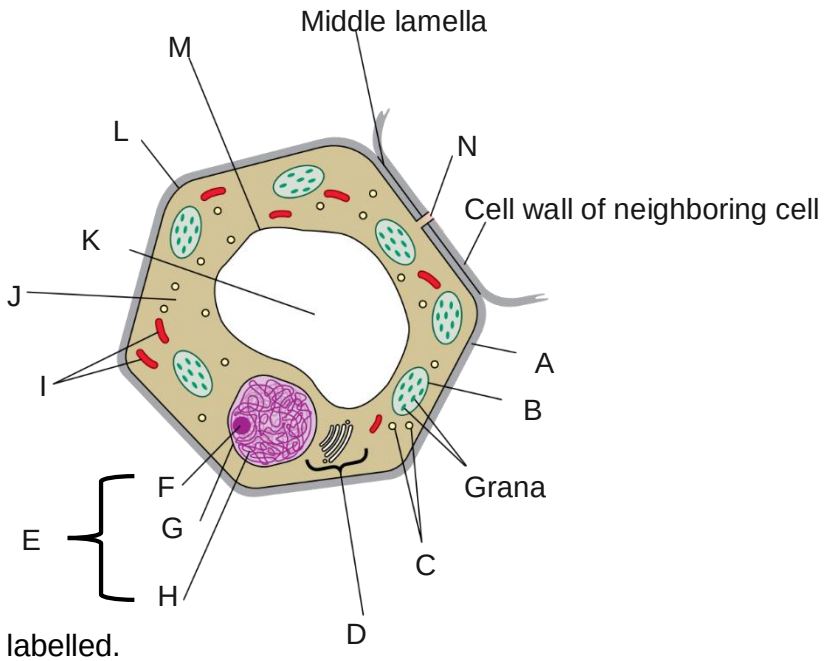
Plant cell

Structure of a plant cell seen under a high quality light microscope



a) Name the parts labelled.

A …….. B ……

C …… D ……

E …… F ……

G …… H ……

I …… J ……

K …… L ……

M …… N ……...

b) Outline the functions of the parts labelled.

A. (Give at least 4)

……..

……

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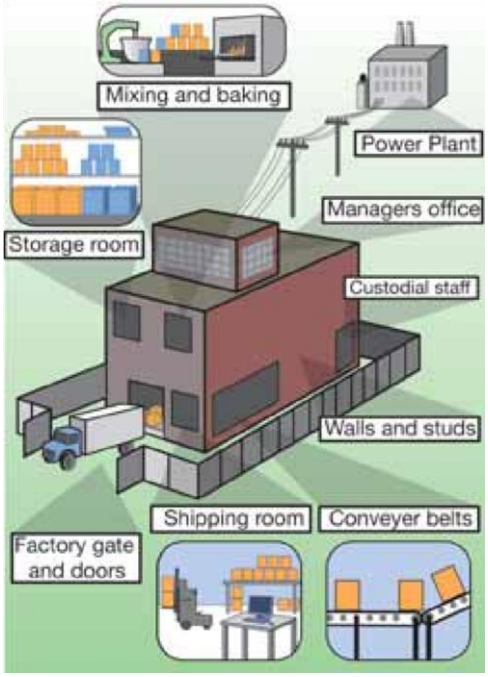
……..

B.

……

Activity of integration

Comparing a cell to a cookie factory



Imagine a factory that makes thousands of cookies a day. Ingredients come into the factory, get mixed and baked, then the cookies are packaged. The factory has many parts that contribute to the process. Can you name some of those parts and their functions? A cell is a lot like a cookie factory. It too has many parts that contribute to its processes.

In this activity, you are required to compare a cookie factory to a cell.

The table below shows the processes which take place at the cookie factory and which departments are responsible for them. Complete the table by filling the parts of the cell which carry out the same functions as a cookie factory.

Process	Cookie factory part	Cell part
Ingredients in/products out	Factory gate and doors	
Control center	Manager's office	
Energy	Power plant	
Storage	Storage room	
Making the product	Mixing/baking room	
Transport of materials	Conveyer belts	
Packaging and distribution	Shipping room	
Clean up and recycling	Custodial staff	
Structure/support	Walls and studs	

How does a cell differ from a cookie factory?

……

……

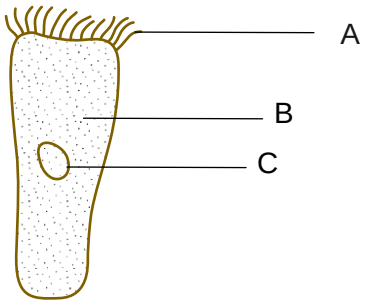
Group activity. 7

Research about specialized animal. Your research should include different specialized cells in animals, where they are found, their structures and how they are adapted to perform their specific functions.

Form a group of 3 to 4 students and discuss to each other your findings. After discussion, answer the following questions and present them in your class in the presence of a teacher.

Qn. Using the knowledge you have collected from research and discussion, identify the specialized animal cells below, state where they are found, give their functions, name the parts labelled and briefly give ways how they are adapted to carry out their functions.

a)



I) Name of the cell.

……

ii) Where it is found.

……

iii) Name of the parts labeled

A …… B …… C ……

iv) Function of the cell

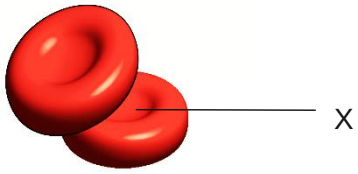
……

v) How is the cell adapted to perform its function?

……

……

b)



I) Name of the cell.

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Function ……

Organ system 2 ……

Function ……

Organ system 3 ……

Function ……

(c) Which organ in plants does the same role as that of organ Y above in animals? (01 marks)

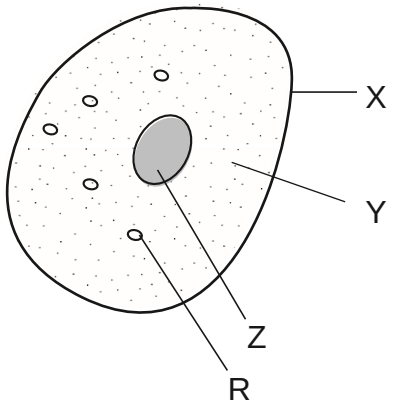
……

d) How does organ Y in the figure differ from that you have answered in c? (02 marks)

……

……

2. The figure below shows an animal cell got from a liver viewed under a light microscope.

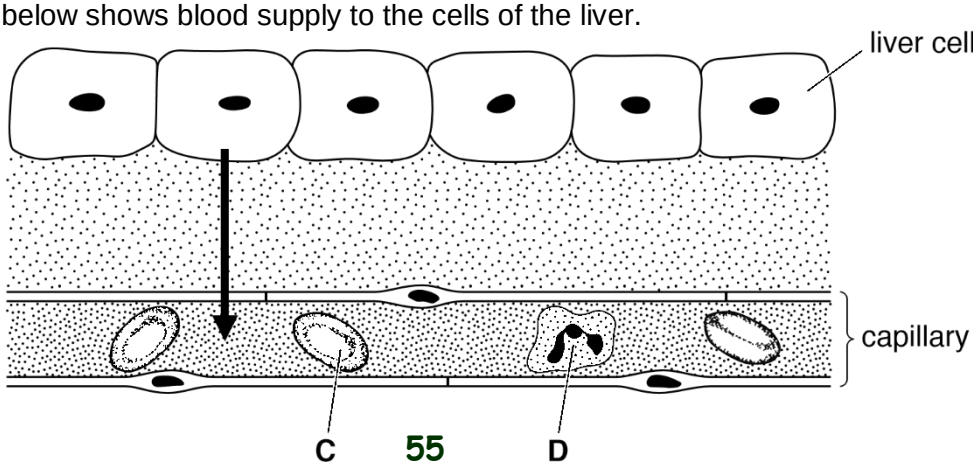


a) i) Name the parts labelled. (02 marks)

X …….. Y ……..

Z …….. R ……..

b) The figure below shows blood supply to the cells of the liver.



3 CLASSIFICATION

3.1 Introduction to classification.

Classification is the process of placing organisms in particular groups basing on their similarities in structures and physiological processes.

Importance of classification.

- It enables scientists to easily identify organisms of the same group.
- It enables scientists to classify new organisms.
- It simplifies studying of organisms of a particular group.

Startup activity.

The picture below shows a number of books delivered by the government to your school. The books are to be filled in your new school library Use it to answer the questions that follow.

QN. You have been chosen to provide instructions to a group of your fellow students who are supposed to put those books in the shelves.

(a) In not more than 60 words, write the instructions to be followed in sorting the books so that library users can easily get access to the book needed.

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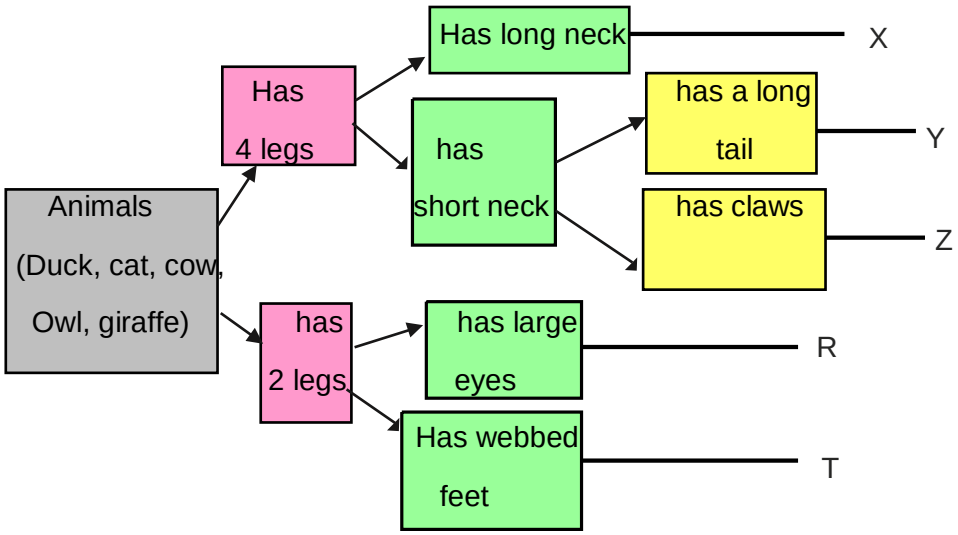
Qn. Study the flow chart below and use it to answer questions that follow.



a) Name the animals

X .....

Y .....

Z .....

R .....

T .....

Qn. Create your own flow chart with five animals and classify them using your flow chat.

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R	A	C	E

Economic Importance of bacteria

- They are used in the manufacture of food like yogurt, cheese like the lactobacillus.
- They are used in genetic engineering.
- They are used to make organic acids like vinegar
- They are used in the manufacture of alcohol
- Bacteria in the gut of ruminants digest cellulose by secreting cellulase enzyme.
- They are used in tanning of lather to purify animal hides making them easy to use.
- They are used in manufacture of antibiotics such as streptomycin.
- They cause diseases in plants and animals e.g typhoid, cholera.
- They spoil food.
- They contribute to soil fertility by fixing nitrogen which is important for plant growth.

Group activity 12. Carry out research on the diseases caused by bacteria. Complete the table by filling in the disease and the bacteria which causes it.

Disease	Bacteria
Typhoid	Salmonera typhi

Project 3.Making yoghurt at school.

Economic importance of fungi.

- They cause diseases to plants and animals like ringworm, white bright.
- They spoil food like the rhizopus growing on bread.
- Some like the mushroom are sources of food to man
- They are used in alcohol brewing and fermentation like yeast
- They are used in bread making.
- Fungi keep soil fertile by recycling organic material through decomposition.

Note; some fungi like puff balls are poisonous thus can lead to death in humans in case they eat it.

Group activity 16. Examples of diseases caused by fungi. Complete the table.

Disease	Fungi
Candida	
Ringworm	
Athlete's foot	
Potato bright	
Leaf rust (in coffee)	

PROJECT ON KINGDOM FUNGI

Studying yeast

Yeast is a member of Kingdom Fungi. Saccharomyces cerevisiae, called baker's yeast, is a fungi often used by cooks and bakers to make breads and other foods "rise".

For this project, you will experiment with some baker's yeast and find out why it is such an important ingredient in bread recipes.

You will need:

- 1 packet of active dry yeast;
- 1 cup very warm water
- 2 tablespoons sugar
- Balloon
- An empty water bottle.

If you fail to get the materials you need, contact the author.

Look on page 211

Follow the procedures:

1. Stretch out your balloon - blow it up several times and then put it aside.

2. Put the yeast, water, and sugar into the water bottle and swirl it around to dissolve the sugar and yeast.

3. Attach the balloon to the mouth of the bottle and set it aside and

Gymnosperms

These plants don't bear flowers. Their seeds are not enclosed in ovaries thus they are referred to as naked seeds bearing plants. They produce seeds on structures called cones.

Examples include; cedar, cycads, cypress pine trees, spruce.

Characteristics of gymnosperms.

- They don't bear flowers.
- Their seeds are found in the cone scale
- They have needle shaped leaves
- They can carry out photosynthesis at low temperature.
- They show xerophytic characteristics like sunken stomata, waxy cuticle.

Note. Xerophytes are plants which grow in arid areas of high temperatures.

Group activity 17: In groups of 3 to 4 students, read the passage below and use it to answer the questions that follow.

(a) Kitawuluzi is a hilly area in kayunga where many different types of trees have grown forming a collection of trees. Years ago, there was a fire outbreak of unknown source which covered the entire part where trees were. The entire vegetation was destroyed and went down except the bracken trees (a type of fern). The bracken trees survived and continued to grow well even in the following season. Carry out research in your groups and suggest why this was so.

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b) During a s.1 biology lesson about kingdom plantae, Mr. mukasa asked students whether plants are the only organisms which manufacture their own food. Nakimwero said that plants are the only organisms which make their own food because that's what her primary teacher taught her. Nakabiti said there other organisms apart from plants which make their own food.

i) Who was right?

……

ii) Give a reason for your answer.

……

c). Explain what the difference is between each pair of terms as

- They have a dorso-ventrally flattened body.

Characteristics of diplopods. i.e. millipedes.

- Abdominal segments are fused and it appears as if they have two pairs of legs on each segment
- They can coil when touched
- They have one pair of antenna
- They carry out gaseous exchange through the trachea.
- They inhabit terrestrial habitats
- They feed on plants.
- They have simple eyes.

Crustaceans

It consists of crabs, shrimps, lobsters, prawn, woodlice and cray fish

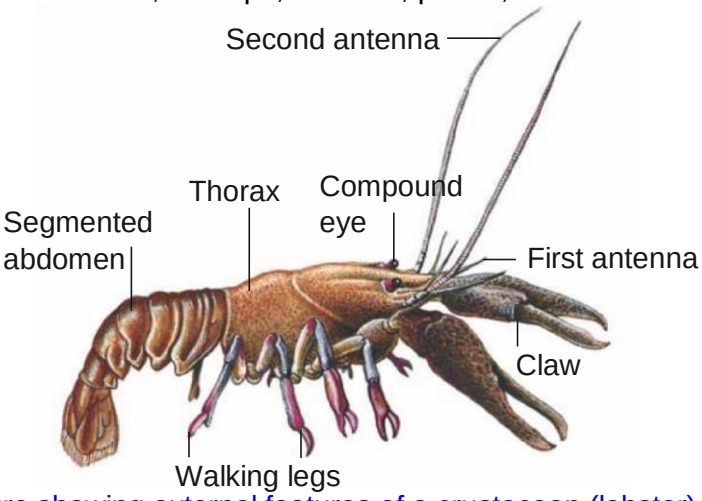
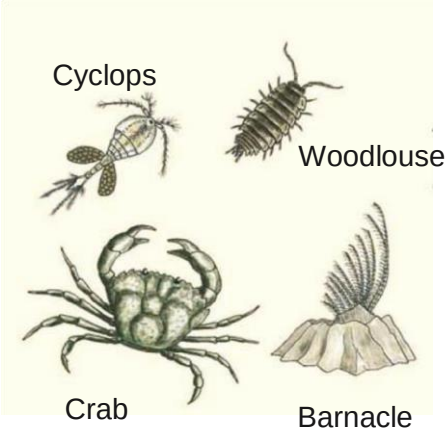


Figure showing external features of a crustacean (lobster)

Characteristics of crustaceans.



- They have two main body divisions i.e. abdomen and cephalothorax(fused head and thorax)
- They have four mouth parts
- They have a pair of compound eyes
- They have two pairs of antennae.
- They breathe by means of gills through the body membrane.
- They have a pair of legs on each segment.

GROUP ACTIVITIES.

Group activity 19. In groups of 3 to 4 students, determine the phylum to which the organism in the picture belongs and give reasons why it belongs to that phylum..

Picture of the animal	Phylum it belongs to	Reasons why
		
		
		
		
		

Virus	Disease it causes	symptoms	Mode of transmission
HIV			
Corona virus			
Hepatitis B			
Ebola			
Cassava mosaic			

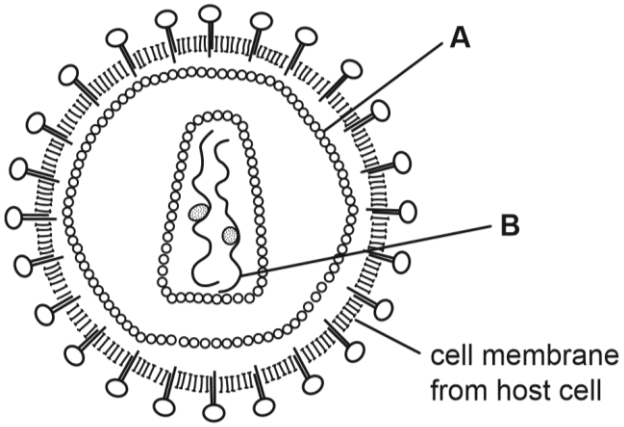
CORONAVIRUS DISEASE (COVID – 19 PANDEMIC)

It is a communicable respiratory disease caused by the coronavirus that causes illness in humans. Scientists think that it began in animals then one or more humans acquired it who then transmitted the infection to other humans. The disease spreads from one human to another through infected air droplets that are projected during sneezing or coughing. It can also be transmitted when humans have contacts with hands or surfaces that contain the virus and touch their eyes, nose or mouth. The disease was first reported in china in 2019 but has now spread to the whole world.

As of January 2022, there are more than 280 million cases and 5 million deaths from covid – 19 diseases in the whole world.In Uganda, there are more than 137,000 cases and 3200 deaths from covid – 19 disease as of January 2022.

3. The figure below shows human immunodeficiency virus (HIV) after release from human cell.

a) Identify A and B.



A ……

B ……

b) HIV infects and destroys white blood cells (lymphocytes). Explain the effect of destruction of white blood cells to the bodies of people with HIV.

……

……

……

c i) List three methods of transmission of HIV.

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ii) Describe ways how the transmission of HIV can be reduced.

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4. The below shows a particular animal. Use it to answer the questions that follow.

a) (i) What is the name of the animal shown above?

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(ii) To which group of chordates does it belong to?

……..

(iii) Give 2 characteristics which prove that it belongs to the group of chordates you mentioned in (ii). Give only the ones you can see in the picture.

……

……

b) (i) Which kind of food does the animal above feed on?. Give 2

……

……

(ii) How is that animal adapted to survive in its environment.

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……

13. Select the correct term to complete the sentences.

amniotic egg	bilateral symmetry	external fertilization
hermaphrodite	lateral line	muscular system
notochord	optic nerve	retina
skeletal system	circulatory system	connective tissue
cornea	digestive system	internal fertilization
lung	mammary glands	placenta
therapsids	invertebrate	ectotherm
endotherm	epithelial tissue	gills
muscle tissue	nervous system	nervous tissue
pupil	radial symmetry	vertebrae

i). One characteristic of animals is that they have tissues like ……. for movement and ……. for response.

ii). Jellyfish, clams, and grasshoppers are ……animals without backbones.

iii) Earthworms are…….because they have both male and female reproductive parts.

iv). The …… provides support, while the ……allows for movement.

v). Animals that are organized around a central point have …….. while animals that have two similar halves have …….

vi). The…… of an animal helps to get nutrients and energy from food that the …….then transports around the body along with oxygen and wastes.

vii). The brain, spinal cord, and nerves make up the …….of a human.

viii). Parts of the mammalian eye include: …….. ……. …….. and …….

ix). Most fish, amphibians, and reptiles are ……s, whereas birds and mammals are ……..s.

4 INSECTS

Reminder on insects.

Insects are one of the organisms we regularly interact with in our environment. They occupy a variety of habitats and are regarded as one of the most successful organisms. They have both useful and harmful implications to us.

Reminder QN.

Write down three characteristics common to only insects but not to other arthropods.(03 marks)

……

……

……

Challenger QN.

(Carry out research in groups of 3 to 4 students and answer the question below. Use the internet and textbooks. Present your work to the rest of the class.)

Why do you think insects are regarded as the most successful organisms on the terrestrial habitat? (10 marks)

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Practical 3. Observing and drawing the antennae of a cockroach.

Instructions; cut off one antenna from the head of a freshly prepared cockroach. Observe it carefully.

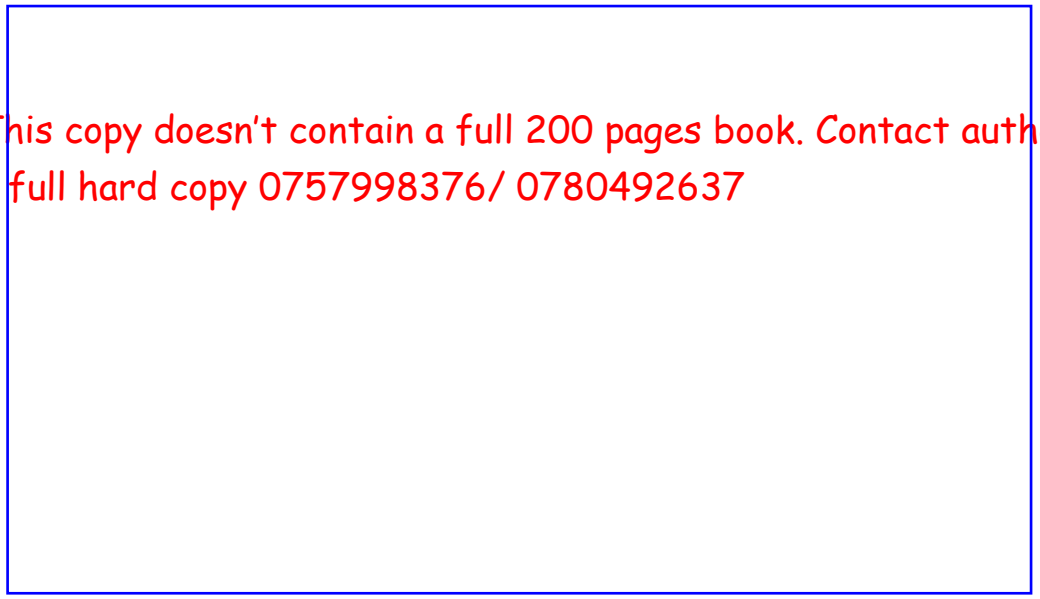
a) Describe the structure of the antenna. (03 marks)

……

……

……

b) Draw and the label the structure of the antenna of a cockroach.



c) Give four ways how the antennae of a cockroach are adapted to perform their function. (04 marks)

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Activity; observing and drawing the mouth parts of a cockroach. (Use a hand lens)

Instructions; clearly observe the mouth parts of a freshly prepared cockroach.

a) Describe the mouth parts of a cockroach.

……

c) Give the adaptations of the following wings to perform their functions.

i) Inner wings of a cockroach.

……..

……

……

ii) Outer wings of a cockroach

……..

……..

……

d) Compare the inner and outer wing structures

Similarities.

……

……..

Differences

Inner wings	Outer wings

Activity; observing the legs of a cockroach.

Instructions; Cut off fore and hind legs from a freshly prepared cockroach

a) Describe the structure of a hind leg of a cockroach.

……

……

b) Draw a well labelled structure of the hind leg of a cockroach.

……

The thorax of a housefly

- It consists of three segments i.e. prothorax, mesothorax and metathorax
- Its mesothorax bears a pair of membranous wings.
- Its metathorax bears a pair of halters which are for balancing.
- Spiracles are present on the second and third thoracic segment.

Practical 6; observing and drawing the leg and wing of a housefly.

Instructions; cut off the wing and the leg separately from a freshly prepared housefly.

a) Draw and label the leg of a housefly.

b) Draw and label the wing of a housefly.

4.4 Honey bee

Habitat; hives in forests and gardens

Food; feed on nectar.

Classification;

Kingdom – Animalia

Phylum – Arthropoda

Class – Insecta

Order – Hymenoptera

Family – Apidae

Genus – Apis

Species – mellifera

External characteristics of honey bee.

Features on the head.

- It bears a pair of compound eyes together with three simple eyes.
- It has a pair of antennae.
- Their head is freely mobile and not fixed to the thorax

Practical 8; Observing and drawing structures on the anterior view of the head of a bee.

Instruction; Observe the head of a freshly prepared bee using a hand lens.

a) Draw and label structures on the anterior view of the head of a bee.

Field work 3

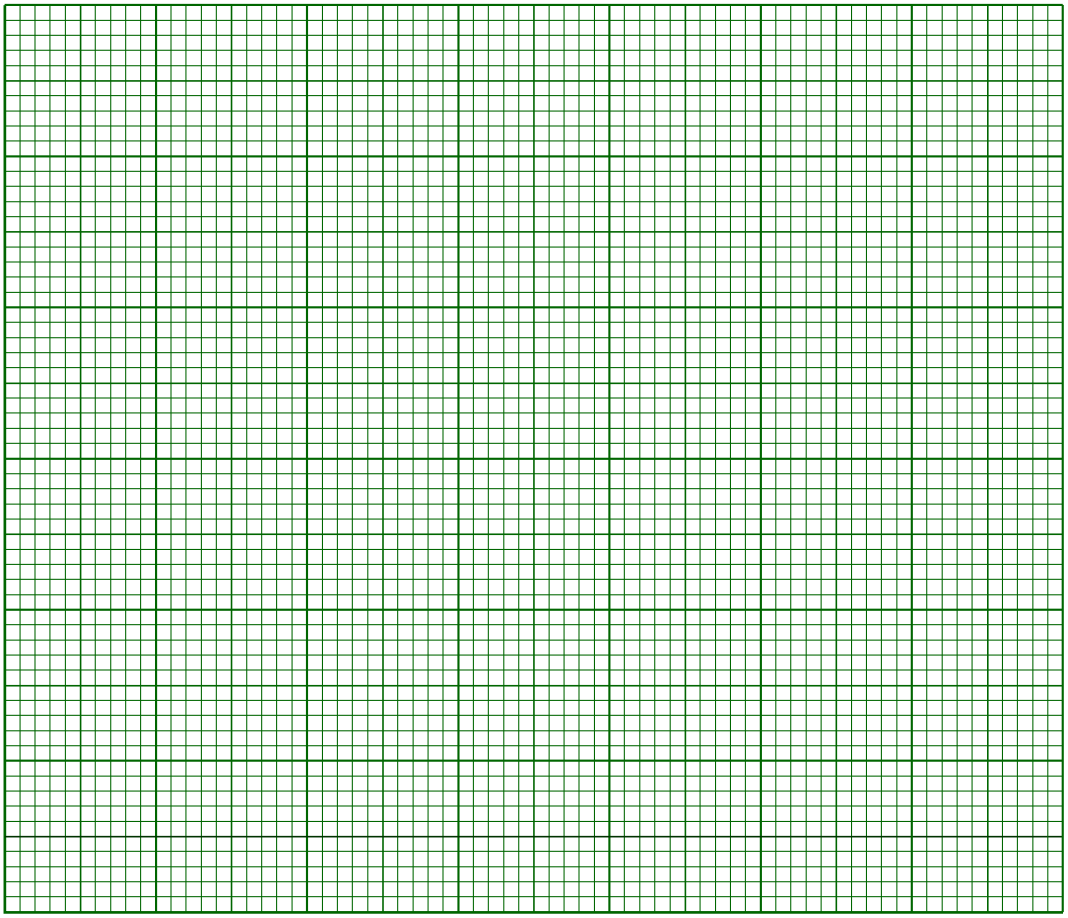
Instructions; In groups of 4 to 5 students, move out to a nearby community outside your school. Identify the most commonly seen insects in the area, Ask about the most commonly suffered diseases from the people in the area. Identify which of those diseases are spread by insects. Observe the environment closely and identify the most causes of the diseases they told you about.

Go back to school and brainstorm in your groups ways you can control the diseases spread by the insects. (You can use the internet and textbooks to research) but everyone in the group must participate.

Write a simplified report in your own words in the space on the next page and present it orally before your fellow students. **Your report should include;**

- **Commonly seen insects in the area.**
- **Diseases in the area spread by the insects**
- **Ways of controlling those diseases spread by insects**

b) Plot a graph of number of insects seen in homes varying with time.



c) From your graph, describe how;

i) The number of mosquitoes varied with time

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ii) The number of houseflies varied with time

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5 FLOWERING PLANTS

Flowering plants are plants which bear flowers.

Flowering plants are made up of two systems which are;

- ❖ Shoot system
- ❖ Root system.

The root system is made up of roots which absorb water from the soil.

The shoot system is made up stems, leaves and flowers. Stems support the plant, leaves manufacture food for the plant and the leaves are used for reproduction.

The root system is connected to the shoot system by vascular tissue which runs from the root to the shoot.

Group activity 25. Comparing parts of different types of flowering plants

Instructions. In groups of 3 to 4 students, get two plants from a nearby garden plucked with their roots. Plant A should be a bean plant and plant B should be a maize plant. Discuss with your fellow students the features below and use them to answer the questions that follow.

Features to discuss about.

- The type of each plant.
- Type of root system of each plant.
- Type of leaf shape on each plant.
- Flower appearance on each plant
- Other features possessed by each plant.

1. Draw and label the parts of plants

Drawing of plant A

ii) Plant B ……..……..

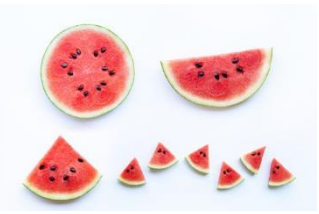
(b) Give the reasons for your answers in 4 (a)

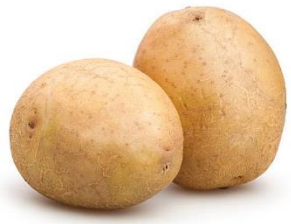
i) ……..……..

ii) …….

Activity; identifying the plant parts that are used as food by people.

Materials; You are provided with the following; orange, water melon, sugar cane, cabbage, irish potato, onion, avocado, pineapple, garlic, maize, ground nuts, cassava and sweet potato.







Instructions; In groups of 3 to 4 students, study each plant part provided and state whether they are fruits, leaves, stems or roots.

4. Nodulated roots; these contain root nodules which shelter rhizobium bacteria for nitrogen fixation like in beans, ground nuts.

5. Stilt roots; these develop from the main stem and provides additional support to the plant like bamboo,

6. Clasping roots; they grow from nodes climbing stems and cling the plant on another for support like vanilla, orchid

Modifications of stems.

- Climbing stems; these cling to other plants using tendrils for support e.g. passion fruit

- Stem tuber; these are swollen and grow underground. They store food. Examples include Irish potato.

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b) Lobed margin; Is where the margin has few shallow indentations

a) Entire margin; Is where a leaf is smooth and has no indentations.

f) Dentate margin; Is where the margin has indentations pointing outwards.

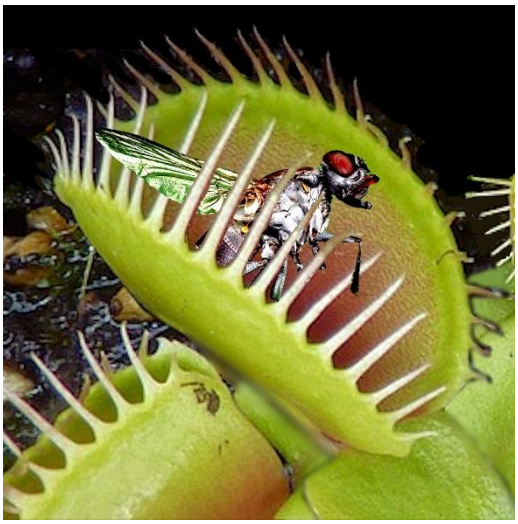
g) Crenate margin; Is where the margin has round indentations.

LEAF SHAPES.

Group activity 28. In groups of 3 to 5 students, make research about the different leaf shapes. Draw and name them in the space below.

- Storage leaves; leaves of plants like onions, cabbages are fleshy and store food and water for the plant.

- Insectivorous leaves; leaves of plants like pitcher plant and venus fly trap have bright colors which attract insects and incase the insects fall on them, they trap them and digest enabling plants to get nutrients like nitates. Insectivorous plants grow in nitrogen deficient soils.



Venus fly trap pitcher plant

- Reproductive leaves; leaves of plants like bryophylum develop out buds which develop into new plants when they mature.

3. Capsules; are dry dehiscent fruits with many seeds and at maturity split along many vertical lines of weakness e.g. cotton, Dutchman's pipe.

4. Schizocarps; are dry fruits which at maturity splits up into two or more parts each containing one seed. e.g. desmodium.

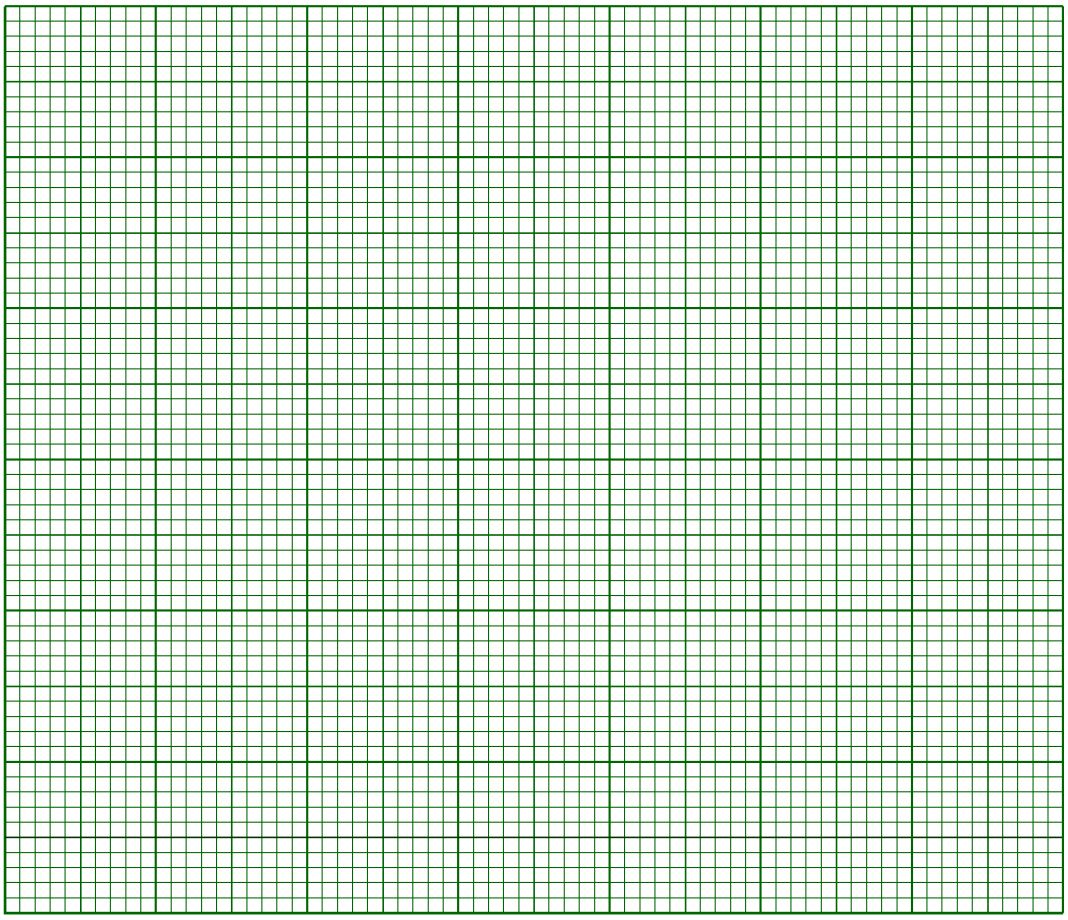
Dry indehiscent fruits

Are fruits with a dry pericarp that don't split up at maturity to release seeds.

Types of dry indehiscent fruits;

1. Achene; is a small, dry one-seeded fruit that does not open to release seeds e.g sunflower.

ii) Construct a histogram to show number of fruitlets per fruit.



b) Describe the type of distribution shown by the raspberry.

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d) Raspberry is juice, sweet and brightly coloured. Suggest how the seeds inside these fruits are dispersed.

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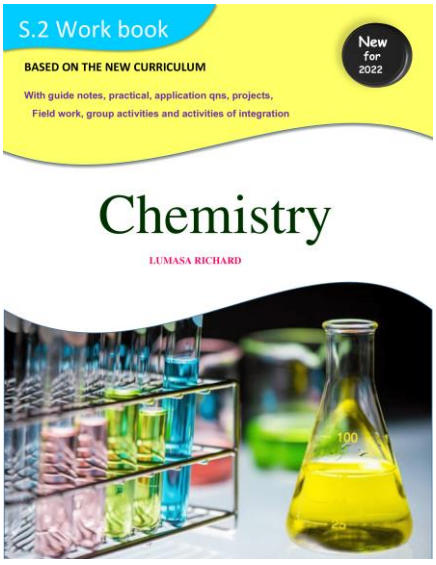

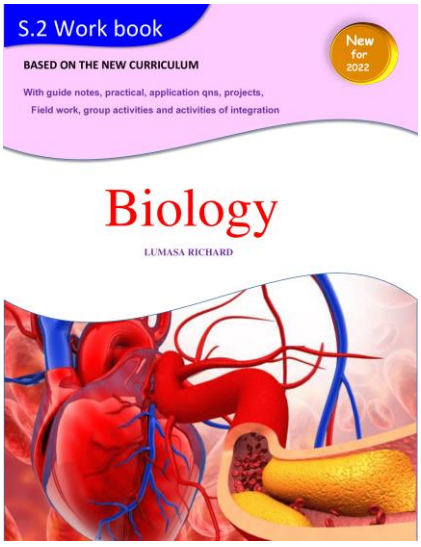

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