

Candidate's Name: .....sign.....

**553/2**  
**BIOLOGY**  
**Paper 2**  
**Nov. /Dec. 2024**  
**1 $\frac{1}{2}$  hours.**

**S.1**



**UGANDA CERTIFICATE OFF EDUCATION  
BIOLOGY**

**Paper 2**

**(Practical)**

**END OF YEAR**

**SENIOR ONE**

**1hour 30 minutes**

**INSTRUCTIONS TO CANDIDATES:**

- This paper consists of **one compulsory** examination item.
- Drawings should be made in the spaces provided. Use **sharp pencils** for your drawings. Coloured pencils or crayons should **NOT** be used.
- No additional sheets of writing paper are to be inserted in the booklet.
- Work on additional sheets will not be scored.

For examiner's use only

Item	1	Total scores
Scores obtained		

## **ITEM 1**

Lukumbi primary school constructed their kitchen using wood. After along third term holiday, the poles of the kitchen were greatly destroyed possessing holes in them and others had fallen down. Several organisms were observed around the kitchen but they were not certain of the organism that caused the damage.

You are provided with organisms W, T and U, which are organisms that were collected around the kitchen and are suspected to having caused damage.

### **Task**

- (a) Using observable features, classify specimens up to at least to their shared taxonomic level. Give two reasons in each case. **[06 scores]**

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- (b) Using features of the head, show how the provided specimens can be identified using a dichotomous key. **[03 scores]**

**[06 scores]**

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(c) Giving two reasons, Identify the organism responsible for the destruction of poles.  
**[03 scores]**

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(d) Describe how the identified organism suited/adapted to cause destruction of the  
poles of the kitchen.  
**[06 scores]**

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(e) Advise the school administrators on how to prevent further destructions by the same organism.

[05 scores]

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(c) Cut off the first body division. Draw and label structures that caused the destruction of poles.

**END**

**WISH YOU SUCCESS**

**#MERRY CHRISTMAS AND HAPPY NEW YEAR#**

Name..... personalno...../.....

Signature.....

553/1

**3BIOLOGY.**

Paper

**MAY/JUNE-**

**2023**

**1½hours.**

**EAGLE'SNESTSECONDARYSCHOOLKAMPALA**  
**COMPETENCYBASEDCURRICULUMASSESSMENT**  
**BEGINNINGOFTERMIIEXAMINATIONS2023**

**UgandaLowersecondarycertificateofeducation**

**BIOLOGYPAPER**

**S.1**

**TIME:1Hr30Mins**

- Attempt **all** the questions in section A and **only one** question from section B
- Diagrams where necessary must be drawn using a sharpened pencil.

**ForExaminersuseonly**

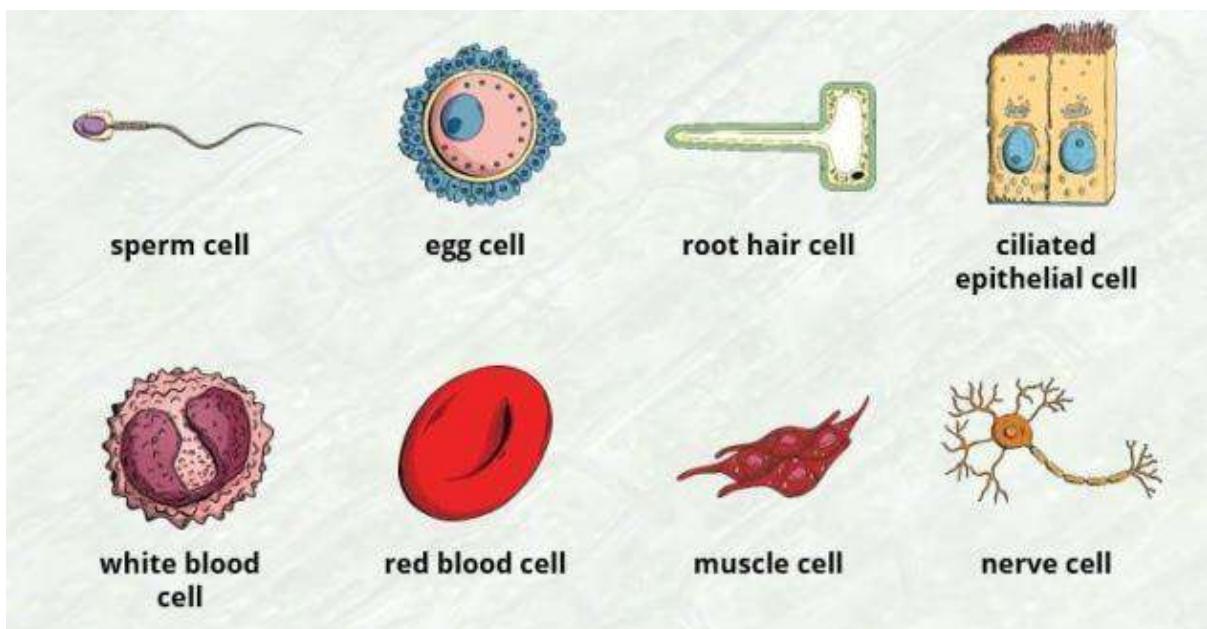
<b>Question</b>	<b>Marks.</b>	<b>Comment</b>
<b>1</b>		
<b>2</b>		

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4		
5		

## SECTION A.

**Attempt all the questions in this section**

1.(a) Cells in multicellular organisms have **unique structures** which enable them to perform a specific role/function. Below are different structures of specialised cells in man. Use them and answer the questions that follow



(i) Given the following adaptations of different cells whose structures are given above. Fill in the spaces provided. (08 marks)

..... has biconcave shape and lack nucleus; which increases its surface area for absorption and carriage of oxygen in the body.

.....is elongated; to increase the surface area for absorption of material such as water and mineral salts.

.....has tiny hair like structures; which sweep mucus and bacteria away from air along the respiratory tract.

.....has large volume of cytoplasm; which increases its surface area making it easier for the development of embryo within and storage of food.

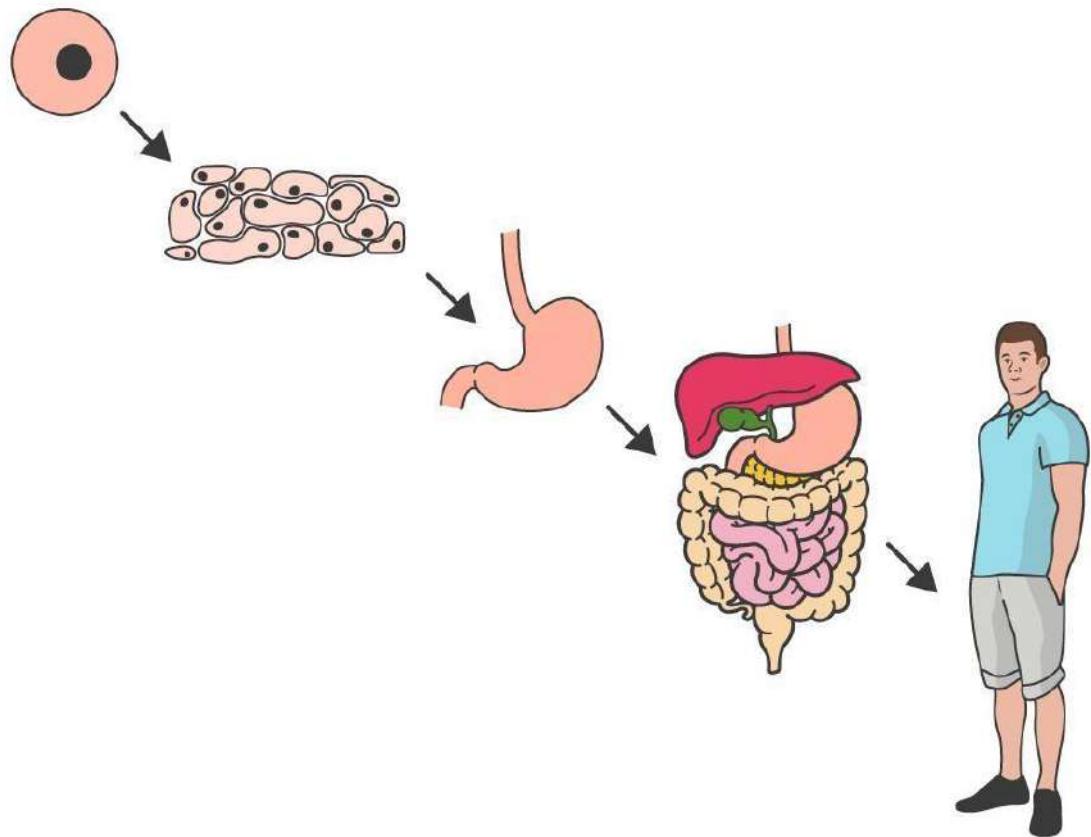
.....has long fibre; which carries signals up and down the body over long distances.

.....contains protein fibres; which contract when energy is available to aid in movement.

.....has a tail; which it uses to propel towards the ovum to fertilise it.

.....has an irregular shape so can change shape; which makes it possible to engulf bacteria and other germs and destroy them.

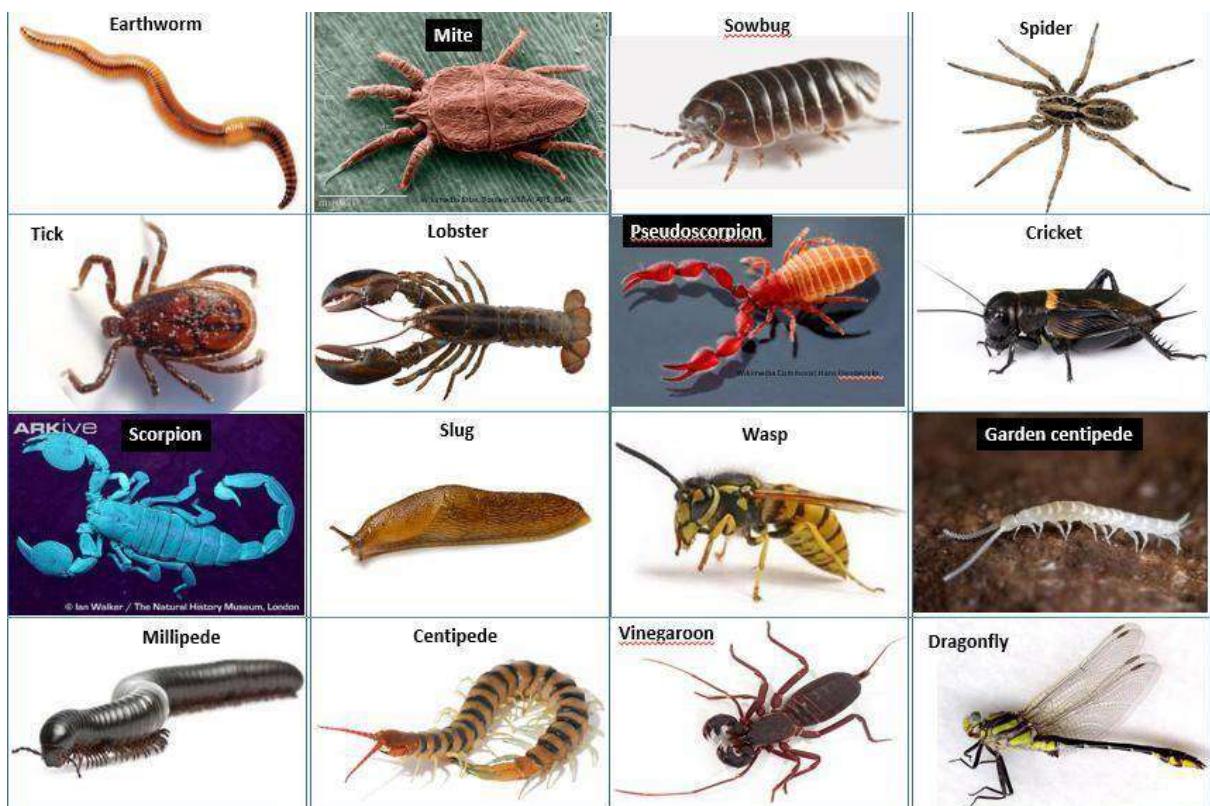
(b) The life processes of human body are maintained at several levels of structural organisation. Below are different structures of organisation in man. Use them and answer the questions that follow.



(i) State the levels of structural organisation in man shown above. (state them in order from smallest to highest level) (04 marks).....,.....,.....  
.....,.....,.....

(ii) Label one each structure above the levels of structural organisation stated in (a)(i) (02 marks)

2. While studying about **classification** of organisms, several charts were displayed with several organisms. The charts enable students to process content and make connections and differences about organisms more easily. Below is one chart with different organisms. Use it and answer the questions that follow.



(a) State the Kingdom to which the all the organisms above belongs. (01 mark)

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(b) From the chart above; which organism(s) belong(s) to,

(i). Phylum Mollusca, (01 mark)

.....

(ii). Phylum Annelida. (01 mark) .....

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(c). State the phylum to which the rest of organisms belongs apart from those in (b) (01 mark)

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(d) Using observable features;

(I) State the differences between spider and wasp. (04 marks)

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(II) similarities between millipede and tick.(03marks)

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(e) Given the classes of classification below.

<i>Class Insecta</i>	<i>Class Custacea</i>	<i>Class Arachnida</i>	<i>Class Chilopda</i>
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State the class of classification to which the following organisms belong.

- (i). Tick.(01mark).....  
.....(ii). Centipede.(01mark).....  
.....(iii). Dragonfly.(01mark).....  
.....(iv). Lobster.(01mark)  
.....(

f) Why is there a need to classify organisms?(01mark)

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(3)(a) The structure and function of a whole or part of a leaf can be modified over the course of evolution as the plant adopts to the particular environment. These are called **modified leaves** which performs specialised function other than the **usual primary functions**. Study the structure below and answer the questions that follow.

# GREEN PEA



(i) Name the leaf modifications shown by the garden pea. (01 mark)

..... (ii) State the adaptation of the leaf modification named above to function its function (02 marks)

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(iii) State any two leaf modifications and their functions apart from the one shown in figure. (04 marks)

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(iv) State anyone ***primary function*** of leaves. (01mark).....  
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(b) A group of S.2 students obtained different kinds of leaves from their school garden and observed their structural features. Below is a table showing the observable features of the leaves recorded by S.2 student.

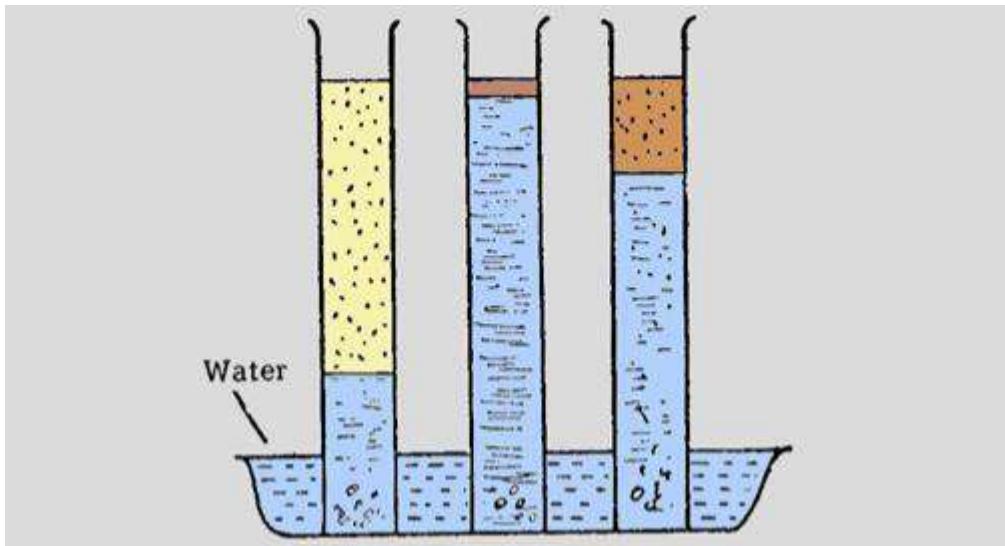
Leaf	Venation	Margin	Lamina	Stalk
P	Network	Entire	Smooth	Petiole
Q	Parallel	Entire	Rough	Sheath
R	Parallel	Serrated	Smooth	Sheath
S	Network	Serrated	Rough	Petiole

Use the observable features shown in the table above and construct a dichotomous key to classify the leaves. (03marks)

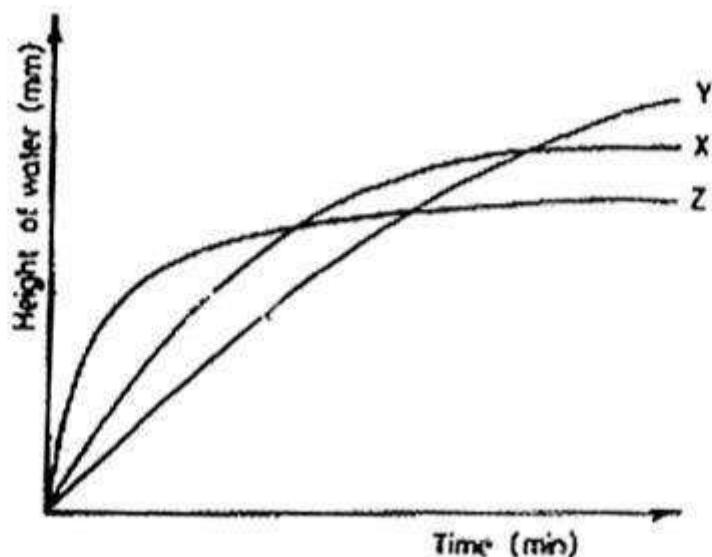
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4. Three samples of soil X, Y and Z were obtained by a group of S.2 and carried out an experiment as the setup below. They measured equal amounts of soil and placed each soil sample X, Y and Z in each capillary tube and dipped the tubes into a trough of water. The setup below shows the ***end of***

**Soil Z**   **Soil Y**   **Soil X**



During the time of experiment up to the end of experiment, the height of water rise in each soil sample along each tube was measured and recorded at regular intervals. A graph of water rise against time was plotted as below.



(a) As a S.2 student who has studied about the properties of soils, state the aim of the experiment. (01 mark)

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(c) Using the graph; compare and explain the water rise in each soil sample X:Y

and Z with time. (08marks).....

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(d) State which of soil sample X, Y and Z is,

(i) Loam soil. (01mark).....

.....(ii) Sand soil. (01mark).....

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(iii) Clay soil. (01mark).....

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## **SECTION B.**

Attempt **any 1 question**. All questions carry equal marks.

5. One S.2 student; Kasolo lost a key for her suitcase one day after school visitation. Her parents visited her and among packages was a loaf of top sweet bread. After a week; she broke the suitcase only to find her bread appearing as in diagram below. Use the diagram to answer the questions that follow.



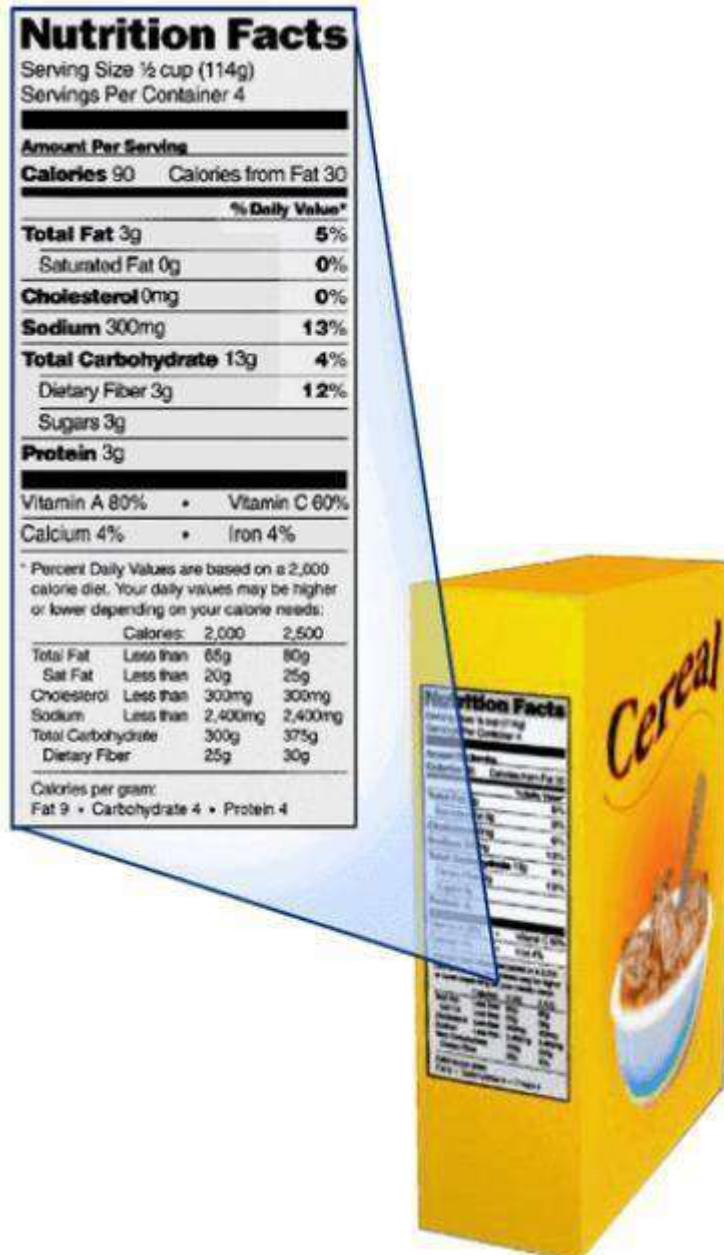
(a) What specific name is given to the organism that developed on Kasolo's bread?  
(01mark)

(b) State the **group** of organisms to which the organism named in (a) belongs.  
(01marks)

(b) Covering the breadth of fundamental and applied research involving the above organisms stated in (b) above, the **advancement in biotechnology involving such organisms**

*smshasgreatlybenefitedmanmuchassomeorganismsarealsoharmfultoman* "As a S.2 student who has studied the above organisms; justify the above statement (08marks)

6. Nutrition is a critical point of health and better nutrition is related to improved infant, child and maternal health, stronger immune systems, safer pregnancy and child health, lower risks of diseases and longevity. Using nutritional content given on this product; use it to teach the people in your village why every child must be given this product at home as a dietary supplement. (10marks)



Call:  
0740-804367 /0788-5945  
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**END**

**IVOXY EXAMINATION BOARD**  
**Uganda Certificate of Lower Secondary Education**  
**End of year examination 2022**  
**Senior 1**  
**1 hour and 30 minutes**

**NAME:** \_\_\_\_\_

**Instructions to candidates**

- i. This paper consists of two sections; Section A and Section B
- ii. Section A consists of 6 structured questions. Attempt **all questions** in this section by filling the answers in the spaces provided.
- iii. Section B consists of four extended short essay questions. Attempt **any three** questions from this section. Answers to questions in this section must be written on separate answer sheets provided. All questions in this section carry equal marks.

**SECTION A**

1. a) Write down any two diseases caused by viruses in Uganda. (02 marks)

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- b) How should Ugandans protect themselves against some of the dangerous viral diseases stated in a) above? (03 marks)

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- 2.** Below is an image of a very important structure of all life in the world.



- a)** What apparatus in the laboratory can be used to observe such an image? (01 mark)

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**b)** Write one reason why you really think that it is important that all living organisms are made up of the structure above. (01 mark)

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**c)** The above structure was extracted from a human cheek, draw and label one such structure which you think you will observe if you try to extract such structures from a bean leaf. (03 marks)

- 3.** There are very many courses at university or even at institutes that involve the use of biology knowledge. State any five importances of people who attend such courses in your community. (05 marks)

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- 4. a)** Write scientific names of any two important organisms in phylum Arthropoda in your society. (02 marks)

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b) Give the different uses of the organisms mentioned in b) above. (03 marks)

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5. Below is a structure from a plant in Kenya.



a) Name the part of the plant shown aside. (01 mark)

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b) Name any two plants around your school that have such a root system. (01 mark)

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c) What is the main importance of such a structure in the cassava plant? (01 mark)

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d) What are some of the other importances of the structure named in a) above? (02 marks)

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6. a) Do you think animals can survive in a world without plants? (01 mark)

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b) Give a reason for your answer in a) above. (01 mark)

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c) Plants look to be totally vulnerable to animal attacks.

i) Give any two ways some plants have been able to protect themselves from animal attacks. (02 marks)

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ii) How best can people protect plants at home from destruction? (01 mark)

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### **SECTION B (Answer any three questions from this section)**

7. Mr. Ssebagala has a farm with animals like cows, goats, hens, ducks and dogs. He wants to make it a study farm for students of agriculture to learn more about animal rearing. He needs to show the learners a quick way to identify the different animals at his home using a flow chart but he cannot make it himself. He has hired you for a payment of 20\$. Therefore make a good flow chart that will make you earn that money. (10 marks)
8. When Mary was sick, she went to the hospital and a certain person called Annet in a white dress like cloth got a blood sample from her using a certain apparatus. Annet took the blood sample and looked through a certain instrument. Then Annet told Mary's Dad that Mary was suffering from typhoid.
  - a) List down some of the important instruments that Annet used to test that Mary had typhoid. (02 marks)
  - b) Which organisms do you think Dr. Annet saw in the blood of Mary to be sure that Mary had typhoid? (01 mark)
  - c) What other structures do you think Dr. Annet can see in the blood of Mary? (02 marks)
  - d) What other diseases can be caused by other organisms in the same kingdom as the organisms mentioned in b) above? (02 marks)
  - e) Give some ways you can prevent such diseases in your community. (03 marks)
9. Explain with examples some ways how the organisms in the following levels of organization are important in Uganda.
  - a) Kingdom monera (03 marks)
  - b) Phylum Angiosperm (03 marks)
  - c) Genus Periplaneta (01 mark)
  - d) Phylum chordate (03 marks)
10. If you are given a job in a cytology laboratory, you study about cells. If you are given a cell from a maize plant and a cell from the hand of a monkey baby, Write a report showing all information that you can present to show the similarity and differences between the two cells provided. (drawing can be used if necessary) (10 marks)

**END**

Name:.....Sign:.....

**BIOLOGY DEPARTMENT, 2023**

**S.1 MID TERM II EXAM**

**TIME 2 HOURS.**

**INSTRUCTIONS**

- Attempt all questions in section A and B
- All answers should be written on the booklet provided to you
- All drawings and some part of the graph should be for the pencil
- Unnecessary crossing will lead to loss of marks
- No external graph is allowed

**SECTION A (60 Marks)**

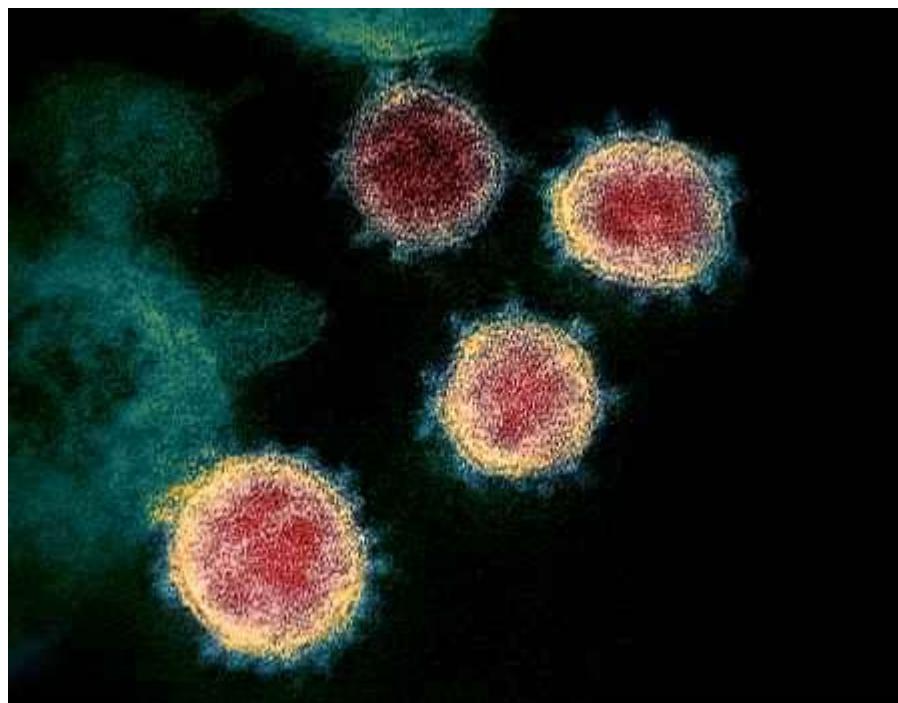
1. Our teacher has a farm, his farm contains different animals; insect, mushroom, toad stools, microorganism like bacteria, cows, sheep.  
Mushrooms like growing unroten materials.

**SUPPORT MATERIAL**



- a) i). Explain why mushrooms like growing on rotten materials (02 Marks)  
ii) How are mushrooms important to you? (05 Marks)  
iii) Name other organisms belonging to the same group as mushrooms (04 marks)
- b) i) Explain why microorganisms like bacteria are abundant in nature (05 Marks)  
ii) Briefly explain why you think students of Think humanity need bacteria in their life. (05 Marks)  
iii) Identify the examples of bacterial diseases that attack man in his life. (04Marks)  
iv) What are the possible measures of controlling the above mentioned diseases? (05 Marks)  
v) Name the kingdom of animal not mentioned above. (01 Mark)
2. Viruses are common in our daily lives, they cause diseases like colds (flu) and more serious ones like Hepatitis B, Ebola in animals as it happened in Mubende last year and cassava mosaic in plants. According to doctors in the world, viral diseases can be treated recently our current minister of health emphasized students and Ugandans in 2020 on the way of preventing on of the pandemic.

### **SUPPORTING MATERIALS.**



- a) i) Identify the pandemic our current minister of healthy was talking about (02marks)
- ii) What are the possible measures of preventing the above viral diseases? (08 marks?)
- iii) Who is the current minister of healthy in Uganda? (01 Mark)
- b) Aids is one of the killer disease (Viral disease) in Uganda, basing on the statistics in Uganda, six people per hour are getting infected with the above disease.
- i) As a student who has studied about viruses, what are the measures of preventing the above disease? (08 Marks)
- ii) State the ways how an individual can be affected with Aids (04 marks)
3. Our body has specialized cells which perform a certain function like protection, reproduction (sexual reproduction) contracting and relaxation of muscles.
- a) Identify the examples of specialized cells in our body (05 marks)
- b) How they are important to our body (give two) (02marks).
- c) What advice would you give to follow students on how to keep the body healthy?

**“VISION SHAPES PEOPLE’S LIVES”**

**END**

**KIYALA HIGH SCHOOL**  
**END OF TERM ONE ASSESSMENT TEST -2024**  
**BIOLOGY**  
**Paper 1 Theory**  
**S.1**

**1 Hours 30 minutes**

## **INSTRUCTIONS**

- *This paper consists of **three** examination items.*
  - *Answer **all the items** in this paper.*
  - *Use of **illustrations and drawings** will earn you more scores.*

## Item 1

Mary who is a student in senior one (1) was sharing with her parents about cells. She explained that cells are basic units used for building the body of an organism just like bricks used to build a house. Her parents however wondered if plants and animals had everything in common since they both have cells.

## *Task*

As a student who has studied cells in biology, explain to Mary's parents the similarities and differences of plants and animal cells. (***Give a clear illustration using a Venn diagram.***) **(20 scores)**

## Item 2

In your community, young boys and girls drop out of school so early and marry. They claim that education looks like a waste of time and even the knowledge attained at school can not be used anywhere in life. They also went a head pointing out that the job market is also not there.

The community leaders are worried and have approached you to talk to the young generation and advice them about the benefits of education.

### *Task*

As a student who has studied biology, write a speech that you can present to your fellow students explaining the importance of studying especially biology and the related careers that one can undertake after completing his or her studies in biology.

(20 scores)

### **Item 3**

Read the poem below and answer the question(s) that follow.

#### **Poem**

“Life”, “Life”, “Life”

    What is life?

    How important is life?

    Oh! Life is Biology.

    And Biology is the study of life.

    The two are together and can not be separated.

    Our everyday life activities apply biological concepts.

    Wake up in the morning, perform all daily activities and see biology all around.

    Let us all study Biology and study life, because it is important to maintain it.

#### ***Task***

As a student studying biology and from the poem above, write a story of how you use biology in your daily routine and suggest life activities that involve application of biology. **(20 scores)**

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**SUCCESS**

NAME:.....SIGN.....

553/2

BIOLOGY

THEORY

Paper 1

2 hours

*Uganda Lower Secondary Certificate of Education*

**END OF YEAR EXAMINATION 2023**

**SENIOR ONE**

**BIOLOGY**

**Paper one**

**TIME: 2 HOURS**

**INSTRUCTIONS**

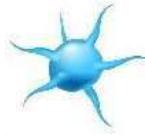
- This paper consists of two questions.
- Attempt all questions in this paper.
- Present your answers precisely in the spaces provided.
- No extra answer shall be provided for rough work.

**FOR EXAMINER'S USE ONLY**

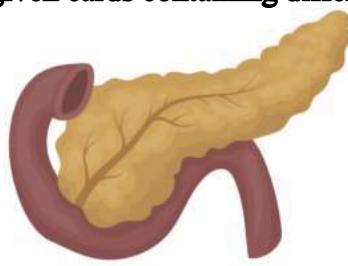
	<b>Question 1</b>		<b>Question 2</b>
	<b>a)</b>	<b>b)</b>	
<b>RELEVANCY</b>			
<b>ACCURACY</b>			
<b>COHERENCY</b>			
<b>EXCELLENCE</b>			
<b>Total</b>			

### Question 1.

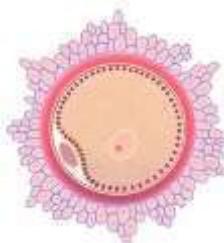
The body of man has many systems that are made up of different components such as cells, tissues and organs. An S.1 student was given cards containing different components of these systems as shown in fig.1.



**CARD 1**



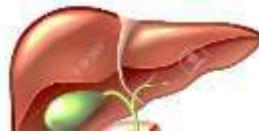
**CARD 2**



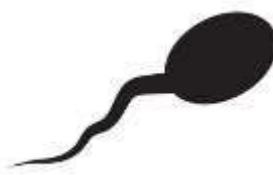
**CARD 3**



**CARD 4**



**CARD 5**



**CARD 6**



**CARD 7**

- a) Using a table template shown below, redraw and make another table that clearly sorts the cards in the four major systems of the body. After sorting the cards, identify the functions of each component in the system stated in the human body.

Card number	Name of the component in the named card	Human body system ( <i>close the table row if the cards for a particular system are completed</i> ).

- b) Make a brief leaflet that shall enable the user to know how the systems identified in the table operate together to ensure the normal functioning of the human body.

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## Question 2.

Juma planted beans at the beginning of the season and on flowering, he observed a lot of different insects such as bees, caterpillars and adult butterflies as shown in *fig.2.* in his garden. Juma fears bees due to their poisonous stings. He decided to spray the garden with insecticide so that to gets rid of the bees. He wants to kill caterpillars too.

**Fig.2.**



Write to Juma a letter that advices him against the action of killing bees for the benefit of his garden. In your letter, inform Juma about his suggested aim of killing caterpillars and on how he can get rid of the caterpillars without killing adult insects.

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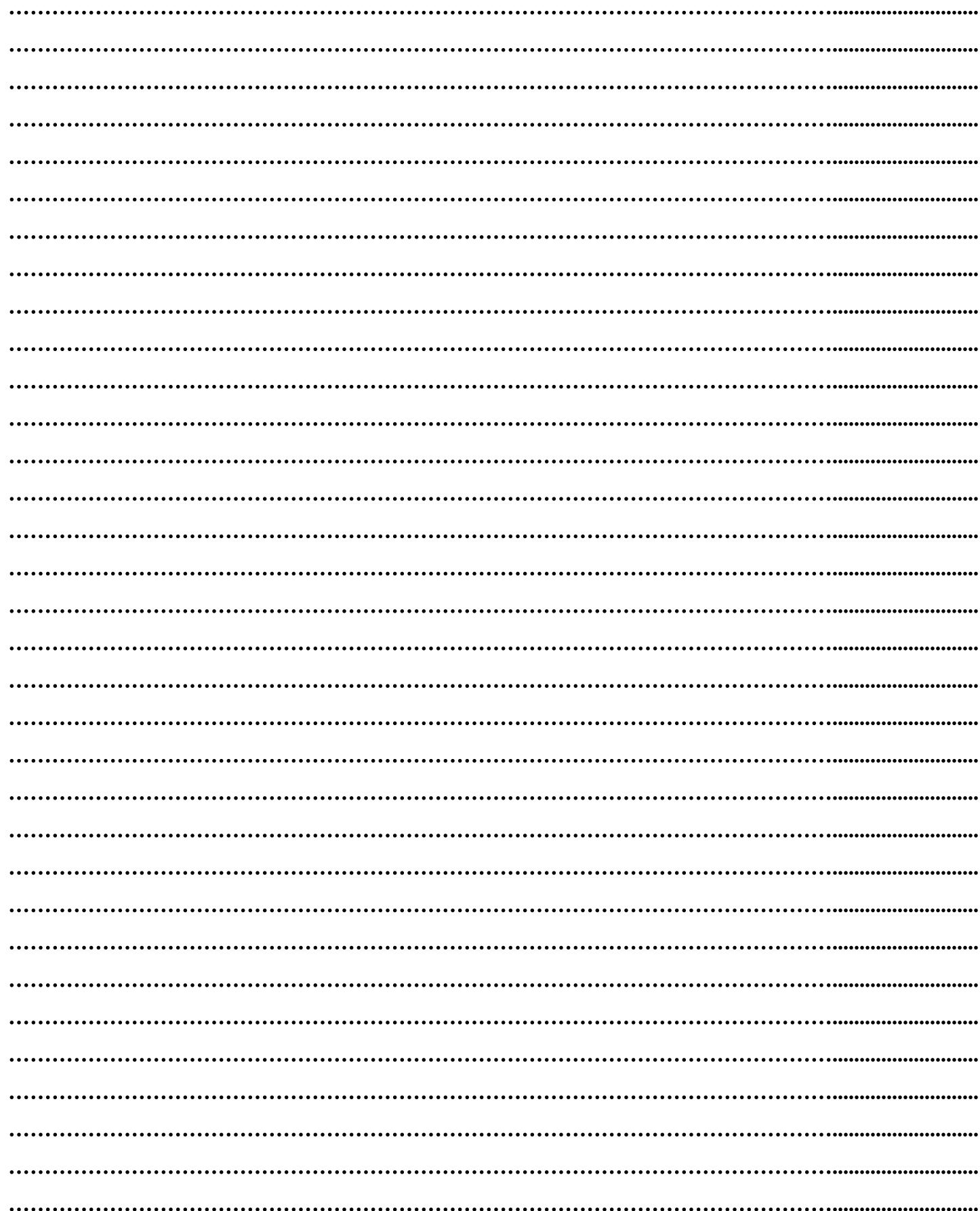
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**COMPILED BY: ONYANGA ISMAIL**

**0702791830/0786911836**

**END**

Student's name..... Signature.....

Stream.....

**553/1**  
**BIOLOGY**  
**(Theory)**  
**Paper 1**  
**OCT/NOV 2023**  
**2 Hours**



**KABALEGA SEN.SECONDARY SCHOOL**  
**UGANDA CERTIFICATE OF LOWER SECONDARY EDUCATION**  
**END OF YEAR COMPETENCE BASED ASSESSMENT**  
**BIOLOGY (THEORY)**  
**PAPER ONE**  
**SENIOR 1**  
**2 Hours**

**INSTRUCTIONS:**

- *This paper consists of **ONLY one Section**.*
- *Respond to **all items** in this paper.*
- *All tasks carry **15 scores**.*
- *Illustrations in form of **drawings** should be made where necessary and **earns scores**.*

<b>For official use only</b>		
<b>Items</b>	<b>Scores</b>	<b>Teacher's comment</b>
1		
2		
<b>Total score</b>		

- Residents of **Kijura Town** have a problem of poor garbage disposal and the whole town is full of flies. There has also been a serious outbreak of cholera. Epidemiologists have associated the outbreak with the increased number of houseflies in the town.

**Task:**

As a biology student, how can you help the residents to understand the relationship of the outbreak and the houseflies and how they can live a healthy lifestyle? (**15 scores**)

- At the end of 2022, Uganda reported that hepatitis had killed 1250 people, Ebola- and AIDS-5200 due to AIDS. The report explained cause of each disease and its effect on the different human body organs and systems. Extremely high infection rates of cassava crops by leaf mosaic disease was also reported. For each disease, Ugandans were sensitized on symptoms and mode of transmission but did not include prevention measures.

**Task:**

Write the key information on each disease based on the report and suggest possible measures of prevention. (**15 scores**)

**END**

*“Always Believe in Yourself”*

# KING'S COLLEGE, BUDO

## BIOLOGY DEPARTMENT

### Chapter one

1. In your groups, study the figure below and answer the questions that follow

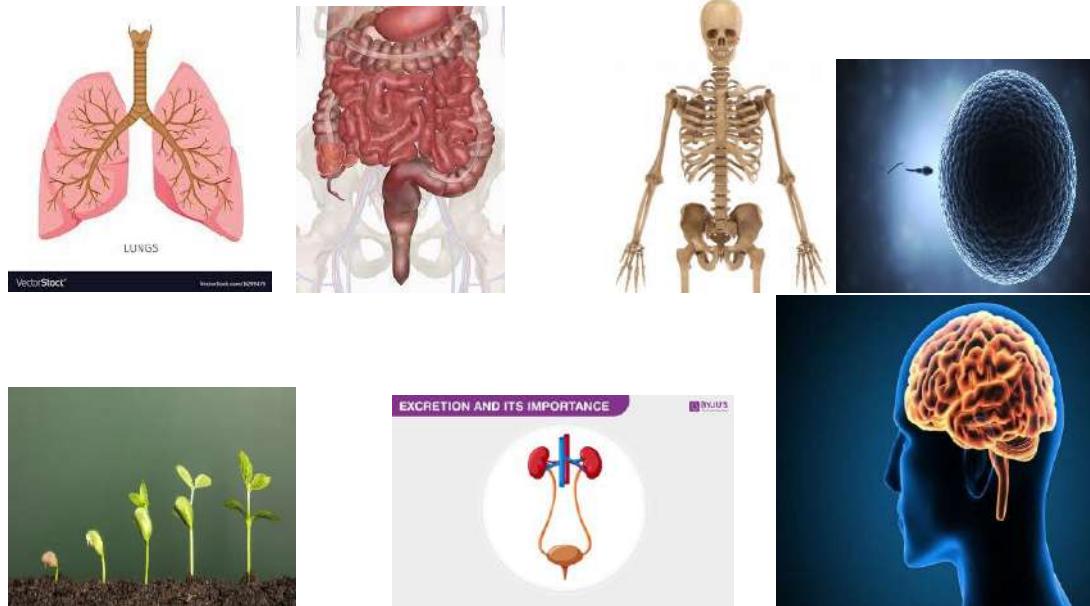


- i. Identify the different careers/professions in the figure above.
- ii. How do the identified careers relate with the different branches of biology?

# KING'S COLLEGE, BUDO

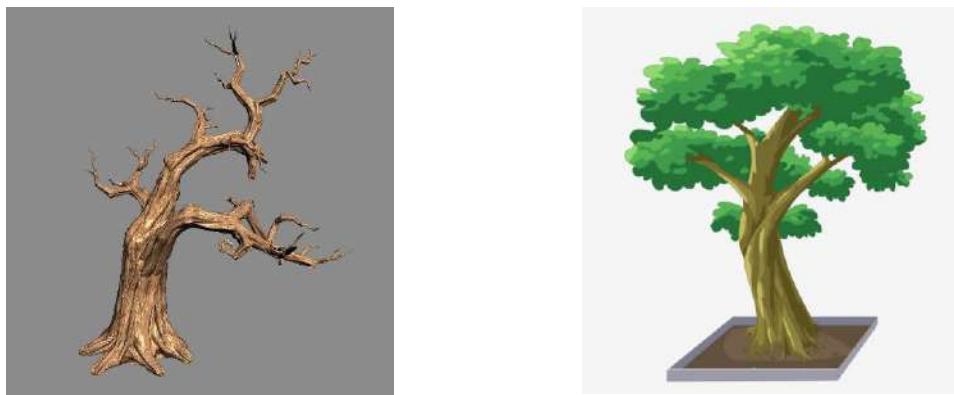
## BIOLOGY DEPARTMENT

2. Group the following structures into the different life processes



- Identify the life process involving the structures in the figure A,B,C,D, E,F and G
- How important is each structure in the process identified

3. Study the organisms below

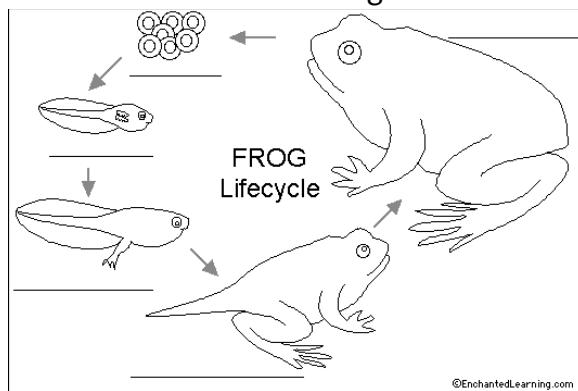


- Identify the differences between the two figures regarding the life processes

# KING'S COLLEGE, BUDO

## BIOLOGY DEPARTMENT

4. Identify the life processes shown in the drawing below



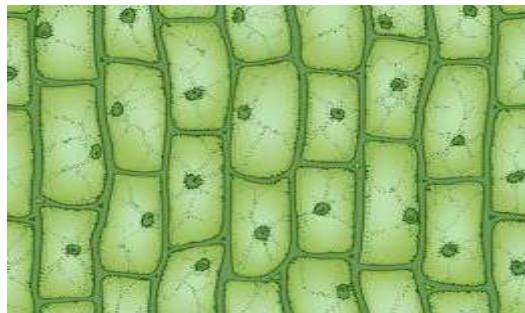
- i. How do the life process help the organism in life

# KING'S COLLEGE, BUDO

## BIOLOGY DEPARTMENT

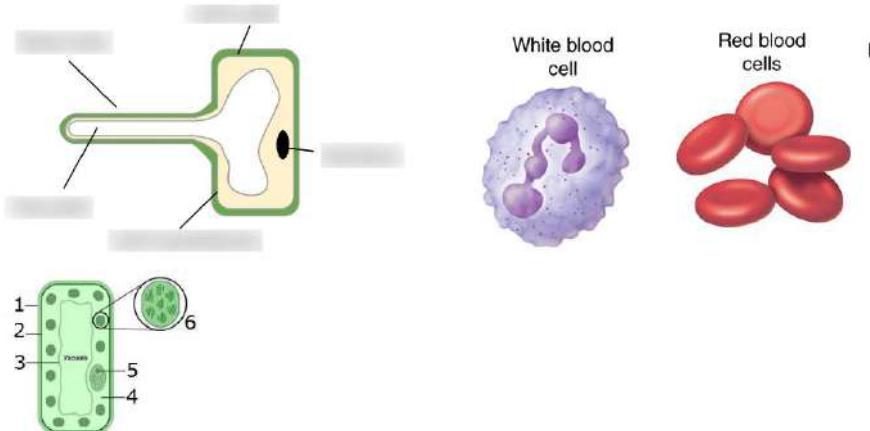
### Chapter 2

1. The figure below shows cells observed under a microscope



- Identify the organism from which the above cells were extracted was observed in the microscope.
- Give a reason for the answer in (i) above
- How many cells are complete?
- Draw out one cell from the figure above and label it.

2. Study the drawings below

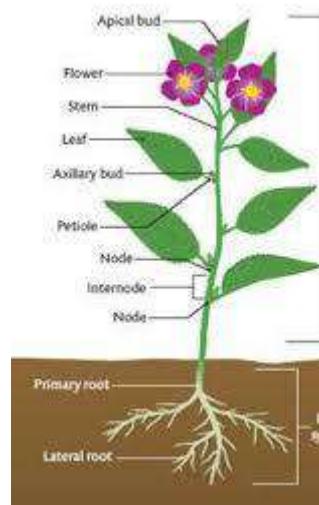


- State any special features seen in the above cells

# KING'S COLLEGE, BUDO

## BIOLOGY DEPARTMENT

3. Below is a drawing of flowering plant



- a. From the drawings, identify the following
  - i. Systems
  - ii. Organs
- b. where on the plant could the two tissues be originating
- c. identify the life processes that link to the plant tissues mentioned



**MATIGO EXAMINATIONS BOARD**  
**UGANDA CERTIFICATE OF LOWER SECONDARY EDUCATION**  
**END OF YEAR ASSESSMENT 2022**  
**SENIOR ONE**  
**BIOLOGY: THEORY**

**Time allowed: 2 hour 15 minutes**

**Please write clearly in block capitals**

**Learner's Number:**  /

**Name:**

**Signature:**

---

**Materials**

For this paper you must have:

- ✓ a ruler
- ✓ a scientific calculator

**Instructions:**

- ✓ Use black ink or black, blue ball-point pen.
- ✓ Fill in the boxes at the top of this page.
- ✓ Answer all questions in the space provided in section A.
- ✓ Use separate answer sheets for section B
- ✓ In all calculations, show clearly how you work out your answer.

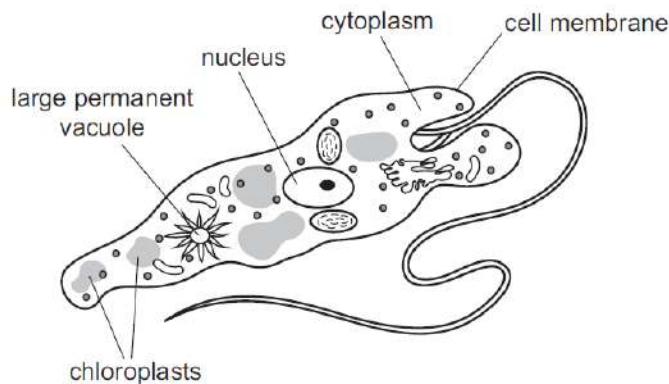
**Information**

- ✓ The marks for questions are shown in brackets.
- ✓ You are reminded of the need for good English and clear presentation in your answers

For Examiner's Use	
Question	Mark
1 - 8	
9	
10	
11	
12	
13	
<b>TOTAL</b>	

## SECTION A

1. (a) The diagram shows a single-celled organism called *Euglena*. Which labelled structures would also be found in an animal cell? (01 mark)



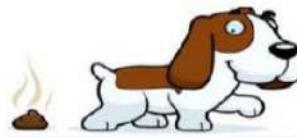
- A cell membrane, chloroplast, nucleus    B chloroplast, cytoplasm, nucleus  
C cell membrane, cytoplasm, nucleus    D cell membrane, cytoplasm, large permanent vacuole

- (b) Draw lines to match the life processes shown in the figure below. (07 marks)

Movement



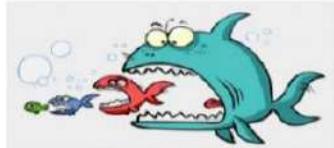
Reproduction



Sensitivity



Growth

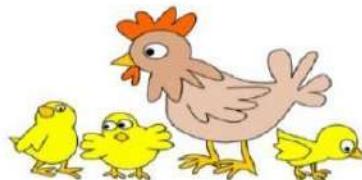


Respiration



Excretion

Nutrition



c) Give one importance of each of the following life processes (02 marks)

(i) Sensitivity

.....  
.....

(ii) Movement

.....  
.....

2. Write a single word to mean the following groups of words (04 marks)

a) Traps sunlight energy for photosynthesis.....

b) Controls activities in the cell.....

c) Part of the microscope with the same function as the pupil in the eye.....

d) Group of tissues.....

3. a) Outline any three rules of nomenclature (03 marks)

.....  
.....  
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b) The scientific name of a certain plant is mangifera indica.

(i) Identify any two mistakes made in writing the name (02 marks)

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(ii) Identify the (02 marks)

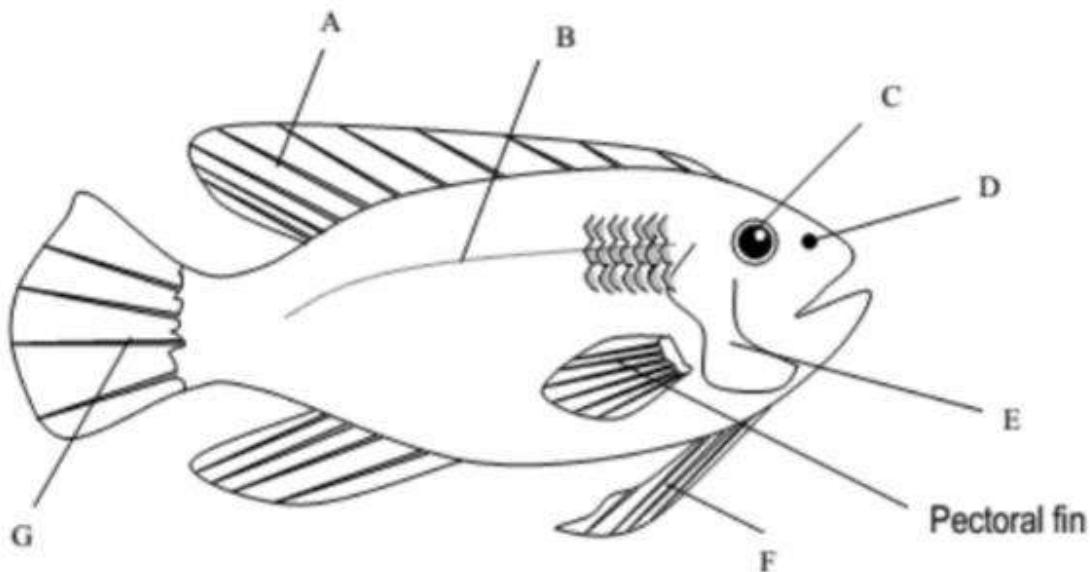
Genus name.....

Specific name.....

(iii) Name the plant with the scientific name given in (b) above (01 mark)

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.....

4. Study the diagram and answer questions that follow.



a) Classify the organism according to (03 marks)

- (i) Kingdom.....
- (ii) Phylum.....
- (iii) Class.....

b) Name the parts labelled A-G (07 marks)

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c) (i) Name the habitat in which the organism lives (01 mark)

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(ii) Using external observable features only, give three ways in which the organism is adapted to live successfully in its habitat. (03 marks)

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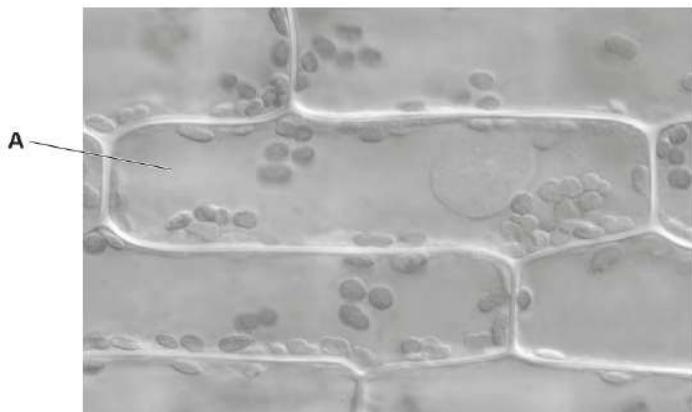
5. (a) What are vertebrates? (01 mark)

(b) Outline the five classes of vertebrates and give an example in each case.

(05 marks)

Class	Example

6. Fig. Below is a photomicrograph showing several cells from an Elodea sp. aquatic



plant.

(i) Draw a large diagram of the cell labelled A in Fig.

(04 marks)

7.



Measure the length of the line PQ on Fig above.

Length of PQ ..... mm

Calculate the actual length of the cell using the formula and your measurement.

$$\text{magnification} = \frac{\text{length of line } \mathbf{PQ}}{\text{actual length of cell}}$$

Include the unit.

(04 marks)

8. (a) Fig. Below is a labelled diagram of the parts of a flower.

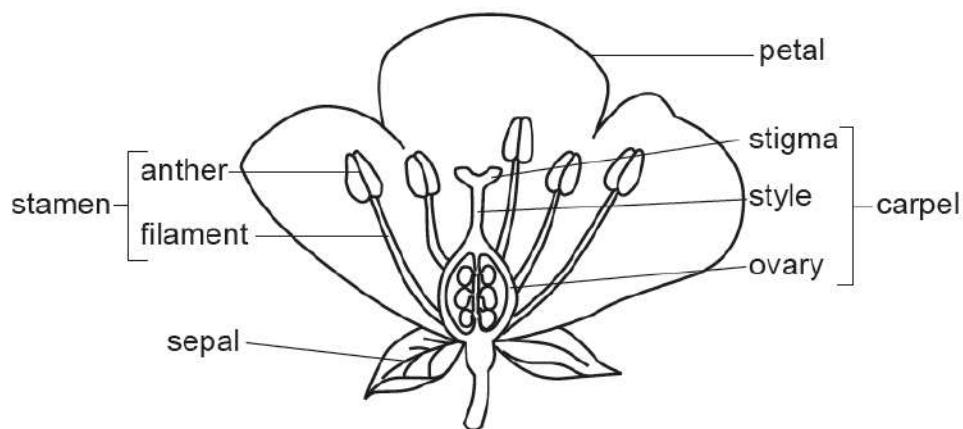
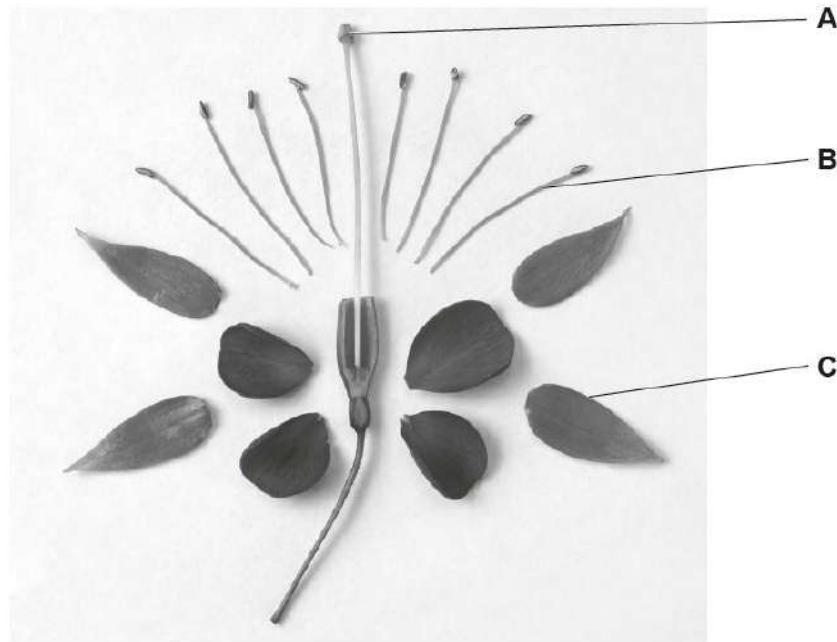


Fig below is a photograph showing the parts of a flower that have been separated



Complete Table below using the information in Figures above and by stating the:

- Names of flower parts A, B and C
  - Number of each of the flower parts A, B and C visible in second figure
- (06 marks)

letter on Fig.	name of flower part	number visible
A		
B		
C		

## SECTION B

*Attempt only two question*

9. a) State the two types of cells  
 b) Make a well labelled drawing of a plant cell  
 c) Give any **five** differences between plant and animal cells  
 d) Outline any three specialized cells and state the function of each.
- (20 marks)

10. a) outline the characteristics of organisms in class insecta  
 b) Give five economic importance of organisms in class insecta.  
 c) List five examples of organisms in class insecta  
 d) Apart from class insecta, list any two other classes of phylum Arthropoda.
- (20 marks)

11. (a) Write the following in full  
 (i) COVID-19  
 (ii) AIDS  
 (b) Name the virus that causes  
 (i) COVID-19  
 (ii) AIDS  
 (c) State three symptoms of AIDS  
 (d) Give five ways through which AIDS is transmitted from one person to another  
 (e) Give three preventive measures for AIDS. (20 marks)

12. a) list the three divisions in kingdom Plantae.

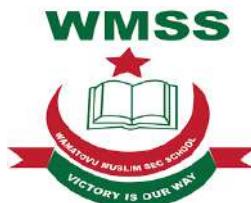
b) The table below shows characteristics of plants P, Q, R, S and T. Use it to answer questions that follow.

Specimen	Leaf margin	Lamina	Petiole	Venation
P	Entire	Smooth	Stalk	Network
Q	Serrated	Hairy	Stalk	Network
R	Entire	Smooth	Sheath	Parallel
S	Entire	Smooth	Sheath	Parallel
T	Wavy	Hairy	Stalk	network

- (i) How many couplets that will be present in the dichotomous key of the above specimens(show working)  
 (ii) Construct a dichotomous key for the above specimens.  
 c) Name the branch of Biology that deals with  
 (i) Structure and functioning of cells  
 (ii) Plants  
 (iii) Inheritance of characteristics from parents  
 (iv) Insects  
 (v) Classifying organisms (20 marks)

**END.**

Name..... Stream:.....



## ACTIVITY OF INTEGRATION

**SUBJECT: BIOLOGY CLASS: SENIOR ONE TOPIC: CELLS**

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**April,2023**

**Answer the task in 1 hour**

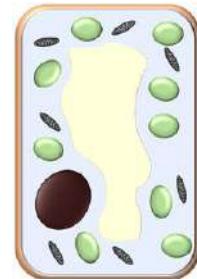
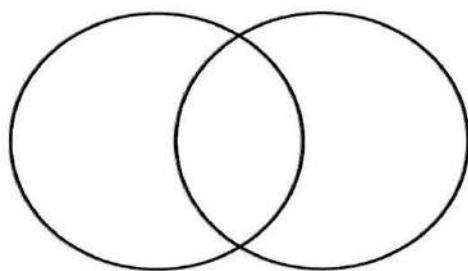
**Indicate your name and stream clearly on this paper**

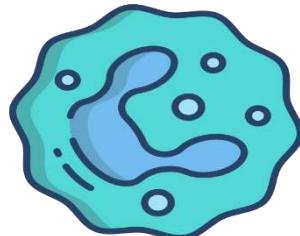
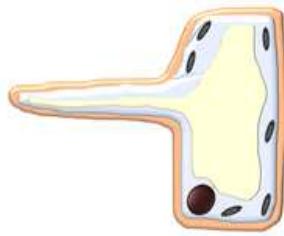
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### Scenario

During a certain holiday, Husinah and her mother went to the garden to do some farm work. When they were digging, Husinah's mother cut herself on the toe using the hoe she was digging with; blood started oozing from the toe. Husinah quickly squeezed some leaves she got from a black jack plant nearby to make a liquid which she applied to cover her mother's wound. Mr. Matovu, the math teacher at a local primary school, passing along saw what Husinah was doing. He asked why she was putting the liquid on her mother's wound. Husinah replied that she was covering the exposed tissues and cells which are in the wound. Mr. Matovu was excited when he had about the word cell. He said it is not a new word to him having studied about cells in 1996 when he was in senior one but said he didn't exactly recall all about them. Husinah went ahead and told him that the bodies of animals and plants contain cells which are specialised. Mr. Matovu remained wondering how he had forgotten about all this interesting part of Biology.

### SUPPORT MATERIALS/DIAGRAMS



**Task**

- (a) As a student of senior one that has completed studying the topic of cells, explain to Mr. Matovu, using the knowledge of mathematics the similarities and differences between the cells found in the black jack leaves and those found in the blood of Husinah's mother.
- (b) Write a brief explanation you would use to remind Mr. Matovu about specialised cells; use two examples from the black jack plant and two from the blood of Husinah's mother.

***END***

***Science is, because we are ...***



**EAGLE'S NEST SECONDARY SCHOOL - KAMPALA**

**MID TERM II ASSESSMENT 2023**

**BIOLOGY**

**SENIOR ONE**

**Time :2Hrs**

**NAME:.....STREAM:.....**

**SINATURE:.....**

***Instructions.***

Answer all questions in the spaces provided.

**Answer all questions in this section in the spaces provided.**

1. A strange flying pest has attacked crop farms in Bweyogerere. The pest destroys crops by injecting them with a fluid, which dries them up. Residents have suggested to form a team of specialists to fight the pest and its effects.
  - a) Identify the branches of Biology from which a team of specialists must be obtained. (03 marks)  
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- b) What is the role of each specialist you have identified in (i) above. (03 marks)

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2. What would happen to a muscle cell if the following structures stopped working? (04 marks)

a) Nucleus

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.....

b) Mitochondrion

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.....

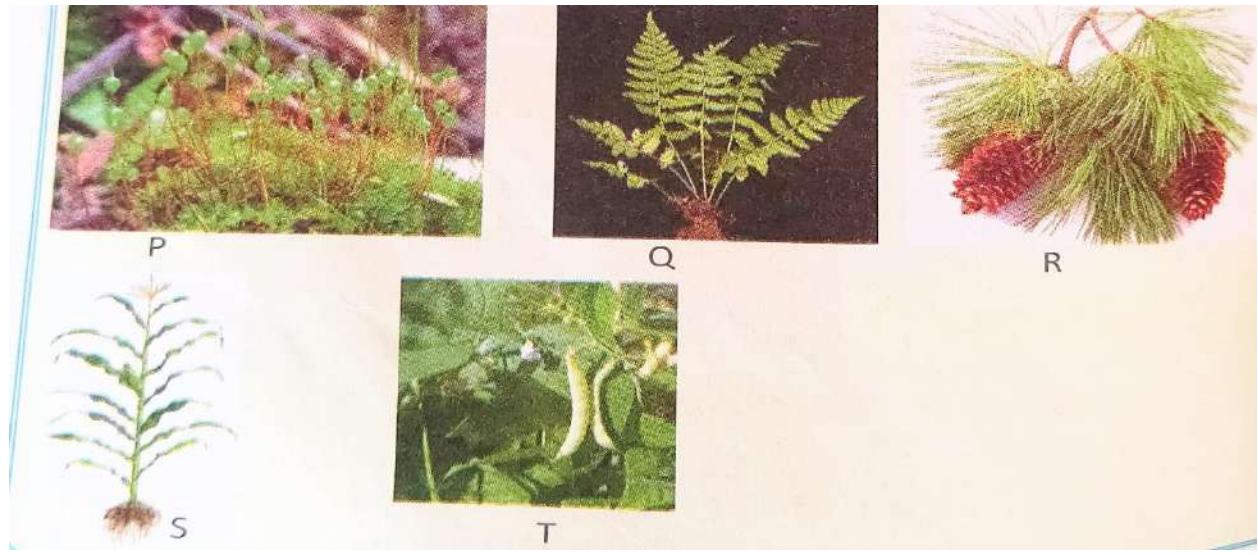
c) Cell membrane

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.....

d) Cytoplasm

.....  
.....

3. The organisms shown in the *figure 1* belong to the same biological grouping.



a) To which grouping do the organisms belong? (01 mark)

.....

b) Why do they belong to that group? (03 marks)

.....

.....

.....

c) Give two differences between the organism S and Q in *figure 1* above.

(02 marks)

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4. Mampi, a senior one student was tested and found with HIV/AIDS. His best friend Kagoda now fears to play or sit next to her because he thinks that he will also contract HIV/AIDS.

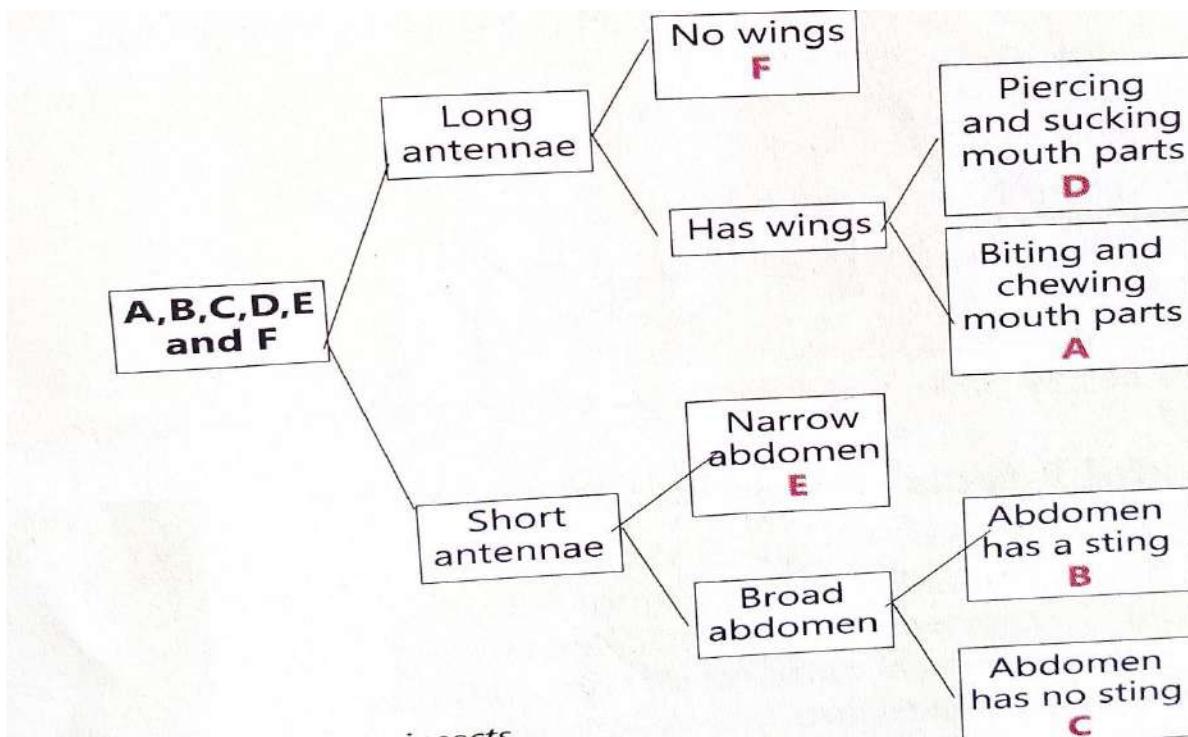
a) Do you think Kagoda is right? Why? (02 marks)

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.....

b) As a friend to both, what advice can you give Kagoda? (03 marks)

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5. **Figure 2** shows a flow chart used to identify insects.



Use the flow chart to identify which of the insects; cockroach, bee, housefly, mosquito, butterfly and termite are represented by letters A to F.

(06 marks)

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6. Closely look at the following scientific names; *zea mays*, *loxodonta Africana*, *Lantana Camara*, *Mangifera-indica*. State how best these names can be written following the binomial nomenclature system. (04 marks)

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7. On her way to school, Cathy came across an exciting organism resting on a tree branch. She could not identify it but said it had fur all over its body, it was eating a banana with different shapes of teeth in its jaw.  
a) Help Cathy identify the organism using its kingdom, phylum and class.

(03 marks)

Kingdom

.....

Phylum

.....

Class

.....

- b) Give two examples of organisms that belong to the same class as the one Cathy saw. (02 marks)
- .....
- .....

8. A bee, mosquito, termite, cockroach and housefly all belong to class *insecta*.
- a) Outline the characteristics of organisms in class *insecta*. (03 marks)
- .....
- .....
- .....

- b) Give five economic importance of insects to people in your community. (05 marks)
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- c) Apart from class insect, state any other two classes in phylum  
*Arthropoda.* (02 marks)
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**END**

Name: ..... Stream: S.1 .....

**BIOLOGY**

**(THEORY)**

**NOVEMBER 2023**



**1 hour 30 minutes**

**KITANTE HILL SCHOOL**

**S.1 COMPETENCE BASED ASSESSMENT**

**END OF TERM III EXAMINATIONS 2023**

**BIOLOGY (THEORY)**

**1 hour 30 minutes**

**INSTRUCTIONS:**

- *This paper consists of nine questions.*
- *Answer all questions in the spaces provided.*
- *Illustrations in form of drawings should be made where necessary, with a sharp pencil.*

1. Some girls are worried of contacting with HIV virus because they sleep with HIV infected members in the same dormitory. This is because their teacher told them that the female anopheles mosquito feeds on blood and therefore it goes on biting person to person while sleeping. Therefore, if it bites a HIV infected member and then bite another normal one, they are worried that the virus can be injected in the normal person. What can you write to remove this worry from them? **(2 scores)**

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2. A person had a fever, and headache and went for medical check up from a medical facility. the laboratory technician found out that his blood contained a higher number of white blood cells than normal. If you were a doctor and received these laboratory results, what would you explain to the patient for the possible cause of the fever and suggest the solution for his problem.

**( 2 scores)**

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3. A market vendor bought Irish potatoes in a sack for sell. After some period of time, she found when some Irish potatoes had sprouted. i.e had grown young shoots on them. she was to inquisitive and interested in knowing how the young shoots developed. If you were close to her, what would you explain to her? **(2 scores)**

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3. Insects pests have become a problem to farmers in Dokolo village however some farmers lack the money to buy insecticides to control the insect pests. Which other alternatives can you give such farmers to control the insect pests. **(7 scores)**

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3. A teenage girl living with HIV and on treatment, has become pregnant by a teenage boy.

The teenagers have become the talk of the community.

a) What is the possible talk about the teenagers by the community? **(3 scores)**

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b) What challenges are faced by the teenagers from the talk? **(6 scores)**

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c) Suggest way forward to help the teenagers.

(6 scores)

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4. The government wants to set up a biological museum in your village. The museum shall contain preserved animals including some of the following animals., A Lizard, Rat, Octopus, Bee, Centipede, tick, Housefly, Crested crane, Frog, Newt, Snake, A Snail, hen, Scorpion and Rabbit.

a) You have been hired as a taxonomist to arrange the preserved animals in **groups** within sections/ shelves made on the wall of the building, in the best way that makes them more similar. In the space below, show how you would best arrange them and include the best appropriate group names.

(18 scores)

b) In case there comes a tourist to the museum who would like to easily identify some organisms by name and characteristics, draft a dichotomous key which would help him identify a Rat, Snake, Hen and Frog.

**(4 scores)**

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.....END.....

**ST. CHARLES LWANGA INTERNATIONAL SCHOOL-KAKIRI**

**S.1 END OF YEAR EXAMINATION 2023**

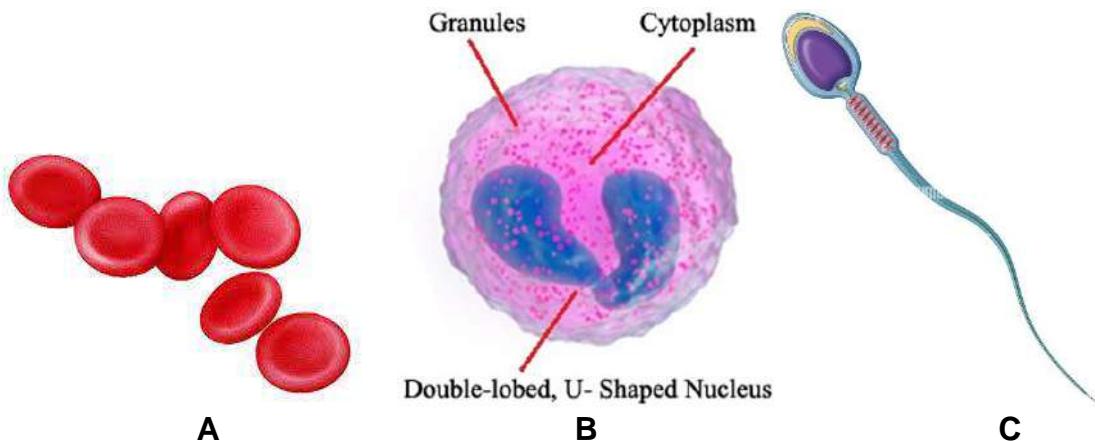
**BIOLOGY**

**TIME ALLOWED: 1 HOUR 30 MINUTES**

**NAME..... STREAM.....**

**Instructions: Attempt all questions in this paper**

1. You are appointed as the District Health Officer (DHO) of your home district. One day, you decided to visit one health center in the district and found one medical worker explaining to a patient about how to identify modified cells in human beings. As a DHO, you decided to display the chart below to help the patient to understand modified cells in animals.



- a) Using the chart, you have displayed above, identify the specialized animal cells above. (03 marks)

A.....

B.....

C.....

- b) Explain to the patient how the cells are modified to perform their specific functions. (06 marks)

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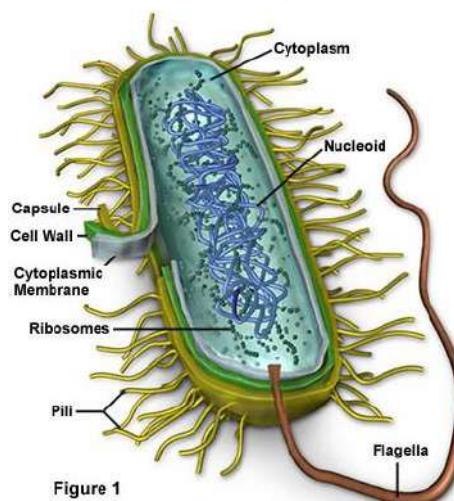
- c) The patient goes ahead and asks you to explain to him what would happen to his body if his blood cells labeled **B** above are damaged in the body. Give a brief explanation of what would happen to the body of the patient. (02 marks)

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- d) The patient also tells you that both plant and animal bodies are made up of cells but he does not know how to distinguish between the cells found in the bodies of plants and animals. As a biologist, help the patient understand how the cells found in the bodies of plants and animals differ from each other. (04 marks)

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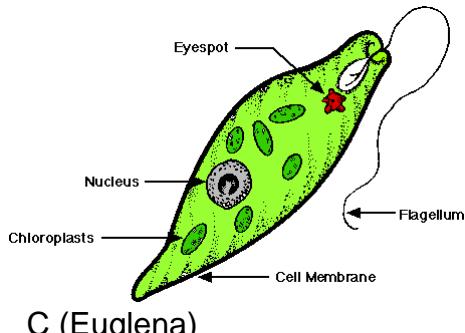
2. S.1 students went for an ecological study trip in Queen Elizabeth National Park. During the study, they encountered different organisms that belong to different kingdoms. The learners carried some experiments on the water and soil samples they collected during the study. Some of the organisms were seen by the learners when they used the microscope. Among the organisms collected by the learners include the following.



A (Bacterium)



B (Mushroom)



C (Euglena)



D (Antelope)

- a) Using the knowledge, you acquired from the study of the five kingdoms of living organisms, group the above organisms into their respective kingdoms giving one reason to support your answer. (08 marks)

Organism	Kingdom	Reason
A (Bacterium)		
B (Mushroom)		
C (Euglena)		
D (Antelope)		

- b) In your own opinion, are mushrooms of any economic importance to man? Support your answer. (02 marks)

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.....

- c) Many people in our communities have suffered from infections resulting from bacteria. What advice can you offer to people in your community that can help them to control the infections from bacteria. (03 marks)

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- d) Kazibwe bought bread from the supermarket. He kept the bread in his cupboard for one week. On picking the bread, he saw there were some organisms growing on it.

- i) Try to suggest the organisms that you think were growing on the bread. (01 mark)  
.....
- ii) Identify the kingdom to which the above organisms belong. (01 mark)  
.....
3. You successfully completed the topic of insects and understood that in our environment, there are a variety of different insects. One day, your biology teacher asked you to visit your school environment and collect several insects and you managed to collect the following insects.



A(Cockroach)



B(Termite)



C(Housefly)



D(Worker bee)

- a) Which observable characteristics did you consider to know that the above organisms are all insects. (03 marks)
- i) .....
- ii) .....
- iii) .....
- b) Carefully observe the above insects and study the structural observable features present on each insect. Using the features that you have clearly seen, construct a dichotomous key to identify the above organisms. (06 marks)
- .....
- .....
- .....
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- c) The above organisms are economically important to man. Give your views to support this statement. (04 marks)

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- d) It is very hard to catch a housefly. Basing on the features you have observed above, how true is this statement. (02 marks)

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4. Your agriculture teacher planted plants in the school garden which bear flowers. The plants include the following maize, spear grass, beans, nut grass, millet and soya beans.

- a) i) What general name do you give to plants that bear flowers? (01 mark)

.....  
.....

- ii) Put the above plants into their correct groups they belong by completing the table below. (06 marks)

Monocotyledonous plants	Dicotyledonous plants

- b) Using the bean plant above, explain how its structure suits it for,

- i) Making food (02 marks)

.....  
.....

- ii) Reproduction (02 marks)

.....  
.....

- iii) Absorption of water and mineral salts from the soil (02 marks)

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- c) Plants are generally important for the survival of other organisms in the environment. Is this statement true or false? Give reasons to support your answers. (02 marks)

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**Student's Name:** ..... **Stream:** .....

**School:** .....

<b>Class</b>	<b>Stream</b>
S. 1	

(Write your Name, Class Stream and School in the spaces provided.)

**553/1  
BIOLOGY  
(Theory)  
Paper 1**

March 2022

1 ½ hours



## **Uganda Certificate Of Education**

### **S.1 COMPETENCE BASED ASSESSMENT EXAMINATIONS**

**BIOLOGY**

**(THEORY)**

**Paper 1**

**1 Hour: 30 minutes**

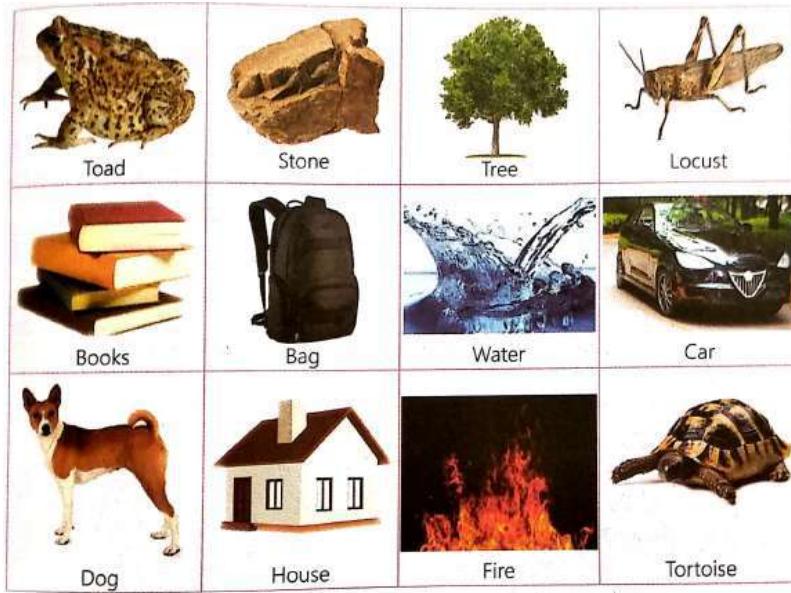
#### **INSTRUCTIONS:**

- This paper consists of **three** questions.
- Answer **all** questions in the spaces provided.
- Illustrations in form of drawings should be made where necessary, with a sharp pencil.

**For official use only**

<b>Number</b>	<b>Score</b>	<b>Teacher's comment</b>
1.		
2.		
3.		

1. Study the pictures below and answer the questions that follow;



(a) Classify the items into two groups by writing their names in the table below; one non-living and the other living things.

**(08 marks)**

Living things	Non-living things

(b) Explain why you have classified / placed those items in those particular categories.

**(04 marks)**

(i) Living:

.....  
.....

(ii) Non-living:

.....  
.....

2. In the word search below;

- (i) Identify and circle ten words that refer to occupations that the study of Biology can lead you to. The words may appear straight across, up-down, or diagonal.

Z	N	P	Y	Z	L	V	Y	C	X	D	R	T	T
W	T	A	S	U	R	G	E	O	N	E	B	S	N
Z	D	T	M	J	P	B	N	T	H	M	I	F	T
C	O	H	V	D	Z	X	O	C	T	N	R	N	L
N	L	O	J	V	R	K	A	T	O	T	L	A	P
U	X	L	L	Q	M	E	K	I	A	R	T	I	Q
R	T	O	N	O	T	D	T	K	J	N	S	C	D
S	F	G	R	N	G	I	C	W	K	N	I	I	P
E	X	I	X	M	R	I	M	G	W	L	C	S	T
L	J	S	Q	T	M	H	S	T	T	R	A	Y	T
G	M	T	U	B	R	R	V	T	R	M	M	H	Z
M	G	N	J	X	P	T	G	W	Q	L	R	P	T
X	V	E	T	E	R	I	N	A	R	I	A	N	M
Z	C	K	P	N	T	P	H	N	V	T	H	M	Z
P	C	B	T	N	N	P	P	J	T	Y	P	Z	B

- (ii) From the words / occupations found, briefly describe what people in any five occupations do in our society. **(10 marks)**

.....  
 .....  
 .....  
 .....  
 .....  
 .....  
 .....  
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 .....  
 .....  
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 .....  
 .....

3. (a) If your school was a cell in an organism, giving a reason in each case, identify the structures or organisms around the school which would represent the following cell parts;

- (i) Cell membrane : .....

Reason : .....

(ii) Nucleus : .....

Reason: .....

(iii) Chloroplast : .....

Reason : .....

(iv) Chloroplast : .....

Reason : .....

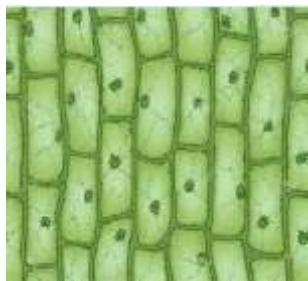
(v) Cell vacuole : .....

Reason : .....

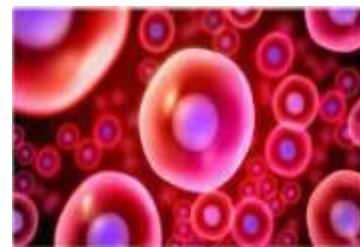
**(10 marks)**

(b) Use the pictures below to answer the following questions

Picture A



Picture B



The above structures are as observed under a microscope and they are very important to life.

(a) Identify the above biological structures in pictures A and B.

**(02 marks)**

Biological structure in picture A : .....

Biological structure in picture B : .....

(b) Draw a single unit from each of the pictures. Do not label.

**(04 marks)**

Single unit from picture A	Single unit from picture B

(c) State any two differences between the single units in pictures A and B. (02 marks)

.....  
 .....  
 .....  
 .....  
 .....

(d) How can the bricks that make up a wall of a building be compared to cells in an organism? (02 marks)

.....  
 .....  
 .....  
 .....  
 .....

**END**



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<https://play.google.com/store/apps/details?id=com.educan.educanapp>

There are a variety of **tests, exams and their marking guides, UNEB past papers and their solutions** at your disposal on the Educan App. The Educan team also marks and provides feedback to those that attempt the topical tests.

**Student's Name:** ..... **Stream:** .....

**School:** .....

<b>Class</b>	<b>Stream</b>
<b>S. 1</b>	

(Write your Name, Class Stream and School in the spaces provided.)

**553/1**

**BIOLOGY**

(Theory)

**Paper 1**

March 2022

1 ½ hours



## **PROGRESSIVE SECONDARY SCHOOL - KITINTALE**

### **Uganda Certificate Of Education**

#### **S.1 COMPETENCE BASED ASSESSMENT EXAMINATIONS**

BIOLOGY

(THEORY)

**Paper 1**

**1 Hour: 30 minutes**

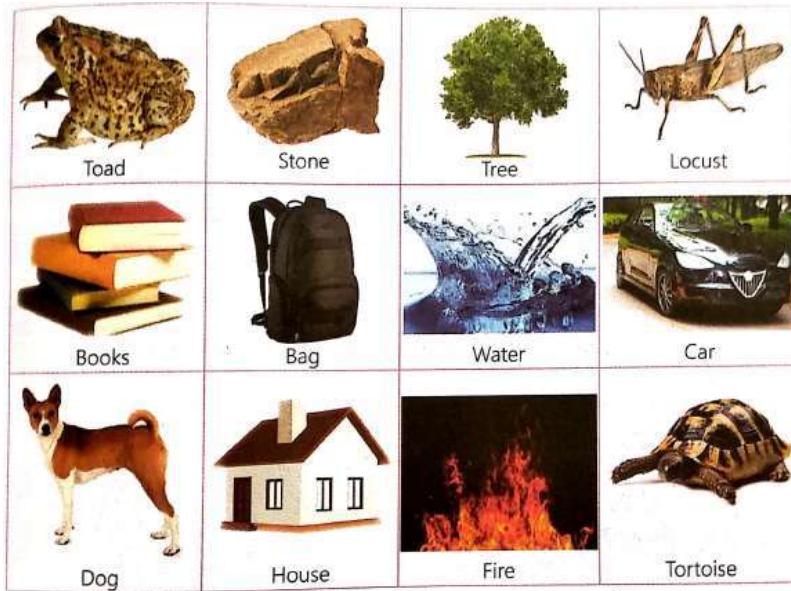
#### **INSTRUCTIONS:**

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<b>Number</b>	<b>Score</b>	<b>Teacher's comment</b>
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1. Study the pictures below and answer the questions that follow;



(a) Classify the items into two groups by writing their names in the table below; one non-living and the other living things.

**(08 marks)**

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Z	D	T	M	J	P	B	N	T	H	M	I	F	T
C	O	H	V	D	Z	X	O	C	T	N	R	N	L
N	L	O	J	V	R	K	A	T	O	T	L	A	P
U	X	L	L	Q	M	E	K	I	A	R	T	I	Q
R	T	O	N	O	T	D	T	K	J	N	S	C	D
S	F	G	R	N	G	I	C	W	K	N	I	I	P
E	X	I	X	M	R	I	M	G	W	L	C	S	T
L	J	S	Q	T	M	H	S	T	T	R	A	Y	T
G	M	T	U	B	R	R	V	T	R	M	M	H	Z
M	G	N	J	X	P	T	G	W	Q	L	R	P	T
X	V	E	T	E	R	I	N	A	R	I	A	N	M
Z	C	K	P	N	T	P	H	N	V	T	H	M	Z
P	C	B	T	N	N	P	P	J	T	Y	P	Z	B

- (ii) From the words / occupations found, briefly describe what people in any five occupations do in our society. **(10 marks)**

.....  
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3. (a) If your school was a cell in an organism, giving a reason in each case, identify the structures or organisms around the school which would represent the following cell parts;

(i) Cell membrane : .....

Reason : .....

(ii) Nucleus : .....

Reason: .....

(iii) Chloroplast : .....

Reason : .....

(iv) Chlroplast : .....

Reason : .....

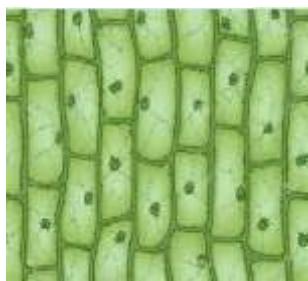
(v) Cell vacuole : .....

Reason : .....

**(10 marks)**

(b) Use the pictures below to answer the following questions

Picture A



Picture B



The above structures are as observed under a microscope and they are very important to life.

(a) Identify the above biological structures in pictures A and B.

**(02 marks)**

Biological structure in picture A : .....

Biological structure in picture B : .....

(b) Draw a single unit from each of the pictures. Do not label.

**(04 marks)**

Single unit from picture A	Single unit from picture B
.....	.....

(c) State any two differences between the single units in pictures A and B. **(04 marks)**

- .....  
.....  
.....

**NAME.....** **STREAM.....**

**SIGNATURE.....**

**BIOLOGY**

**THEORY**

**1½ HOURS**

**AUG 2023**

## **UGANDA CERTIFICATE OF LOWER SECONDARY EDUCATION**

### **SPECIAL ASSESSMENT EXAMINATION 2023**

#### **S.1 BIOLOGY**

**1½ HOURS**

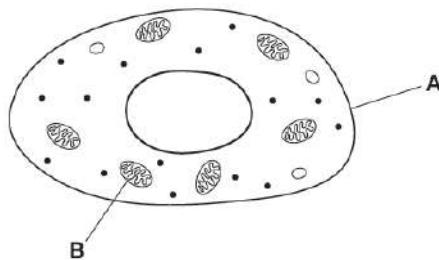
#### ***INSTRUCTION.***

ATTEMPT **ALL** QUESTIONS IN SECTION A AND ANY ONE FROM SECTION B.  
ANSWERS TO ALL QUESTIONS IN SECTION A **MUST** BE WRITTEN IN THE  
SPACES PROVIDED. PRESENT YOUR WORK NEATLY

#### **FOR EXAMINERS USE ONLY**

<b>NUMBER</b>	<b>MARKS</b>	<b>COMMENT</b>
<b>1</b>		
<b>2</b>		
<b>3</b>		
<b>4</b>		
<b>TOTAL</b>		

1. Look at the diagram of an animal cell.



a. Write down the name of structures A and B

A.....

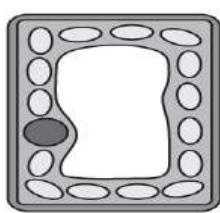
B.....

b. Write down the function of structures A and B.

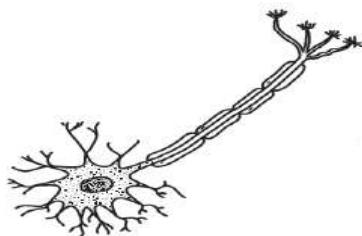
A.....

B.....

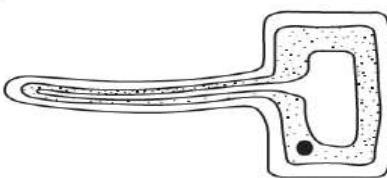
c. Look at the diagrams of different cells.



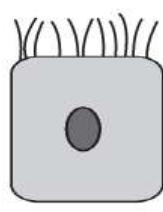
A



B



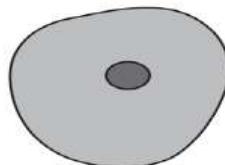
C



D



E



F

(i) Four of the cells are animal cells.

Write down the letters of the **four animal** cells.

.....  
(ii) Write down **two** reasons why these cells are animal cells and **not** plant cells.

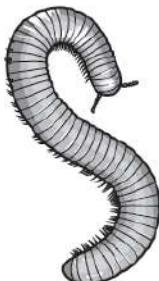
1.....

2.....

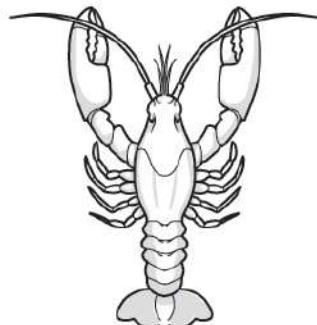
(iii) Microorganisms are made of cells. How many cells does a typical microorganism contain?

.....

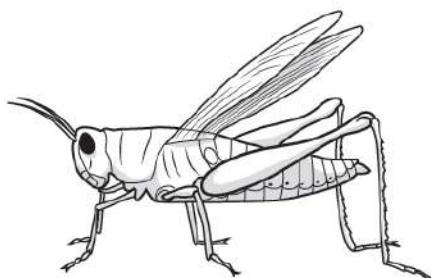
2. Look at the diagrams of the four arthropods, **A**, **B**, **C** and **D**.



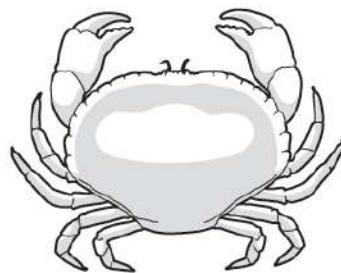
**A**



**B**



**C**



**D**

Use the key to identify each arthropod.

1a	has two claws	go to 2
1b	does <b>not</b> have claws	go to 3
2a	has a segmented tail	<i>Orconectes punctimanus</i>
2b	does <b>not</b> have a segmented tail	<i>Cancer pagurus</i>
3a	has wings	<i>Schistocerca gregaria</i>
3b	does <b>not</b> have wings	<i>Enantiulus armatus</i>

Write the letter of the correct arthropod next to its name.

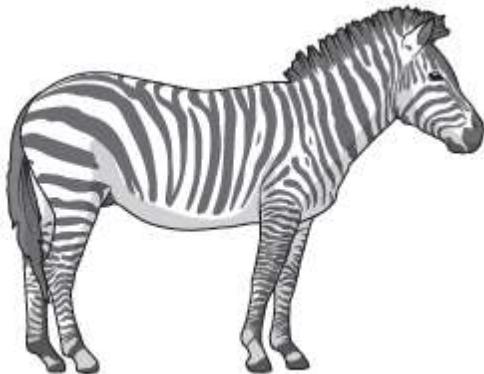
*Orconectes punctimanus*.....

*Cancer pagurus*.....

*Schistocerca gregaria*.....

*Enantiulus armatus*.....

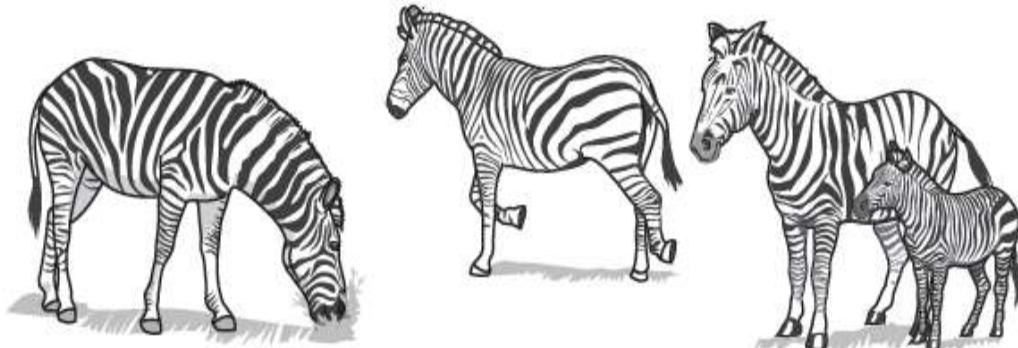
b. The mountain zebra belongs to the species, *Equus zebra*.



(i) Define the term **species**.

.....  
.....

(ii) Growth is one characteristic of living organisms. Write down **three other** characteristics of the living organisms shown in the pictures.

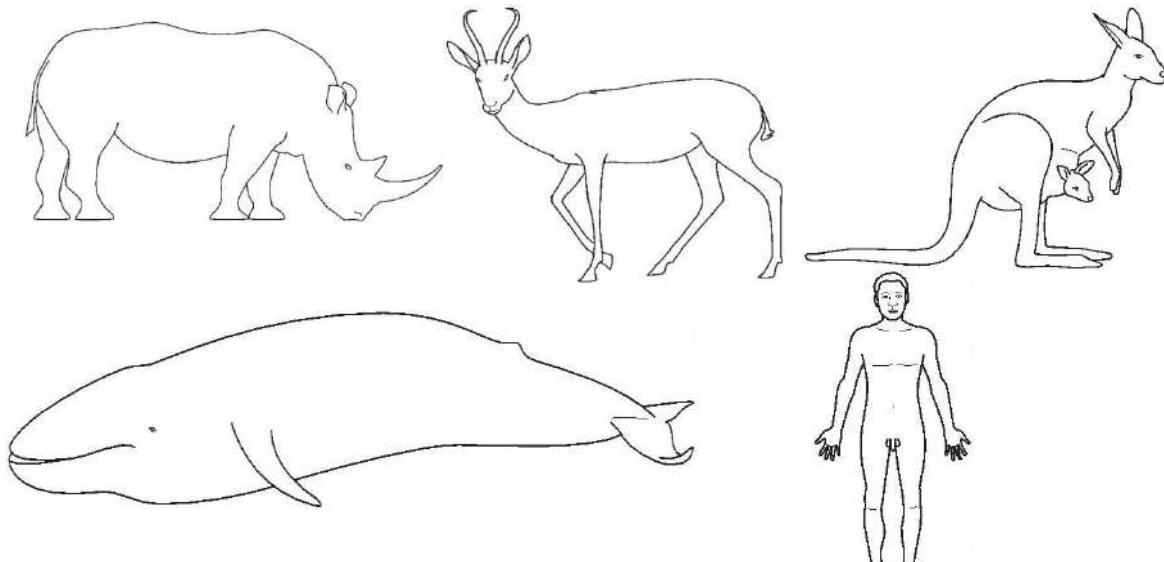


1.....

2.....

3.....

3. The diagram below shows five different mammals.



a. What do you know about mammals?

.....

.....

.....

.....

.....

b. Give five economic importance of mammals

.....

.....

.....

.....

.....

c. Construct a dichotomous key that can be used to classify the above mammals.

4. Fill the blank of the table below with **yes** or **no** using the knowledge you've acquired from the biology lessons and research work.

Question	Virus	Bacteria	Plant
Is made up of more than one cell			
Is considered living			
Can locomote on its own			
Can produce or replicate			
Has DNA			
Has specialized structure and internal compartments			
May have a cell wall			
Has ribosomes			
Has cytoplasm			
Has mitochondria			

END



“NO MATTER HOW YOUR DAY STARTS, ALWAYS FIND TIME TO  
MAKE IT GREAT” ~ CAPTAIN AMERICA

# LIGHT ACADEMY SECONDARY SCHOOL

S.1 BIOLOGY

Mr. KAZIBA NASWIIF

# Chapter 1: Introduction to Biology

1. Use the picture below to answer the following questions.



- a) Identify the organisms in the above diagram.
- b) With reasons, identify the life processes carried out by the above organisms.
- c) How is the above life process beneficial to the above organisms?

- a) Give any other life processes apart from those demonstrated above in the diagram with their importance.
- b) Do plants and animals carry out ALL the life processes in the same way, elaborate by comparison.

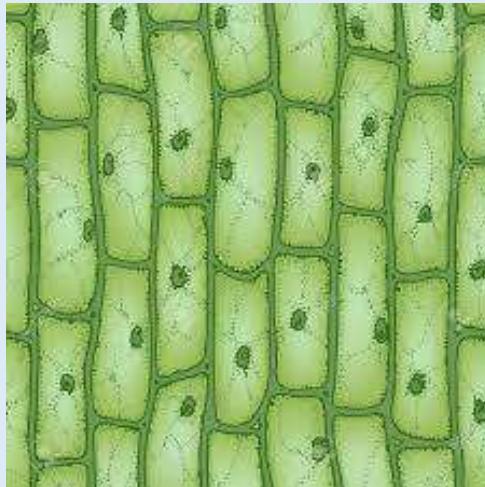
You are in a community around a grassland. There is a lioness which always come at night and attack the livestock of the locals. The locals are planning to attack and kill the lioness because they are fade up with the losses. You are a Biologist who is interested in conservation, prepare to sensitize the angry community and give them measures of how to deal with this challenge



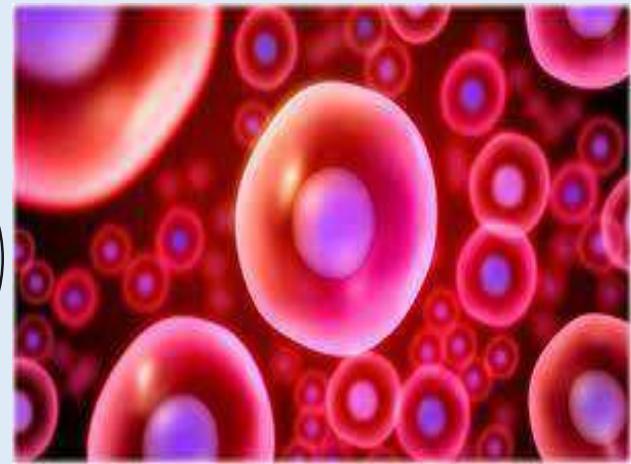
# Chapter 2: Cells

- Use the pictures below to answer the following questions

A.



B.



The above are as observed under a microscope and they are very important to life.

Identify the above biological structures

Draw a single unit from each of the pictures. Do not label.

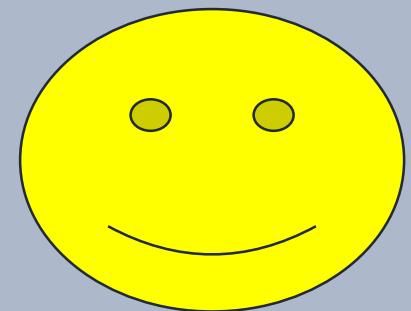
Identify the similarities and differences between a single unit of 1 and 2

The work is to be done in  
one week's period.

Stay home

Stay safe

Wash your hands



Name.....personal no...../...../.....

Signature.....

553/1

**BIOLOGY.**

S.1

*Aug-2023*

**1 ½ hours.**

**LAROO SECONDARY SCHOOL**

**BIOLOGY EXAMINATIONS**

**BIOLOGY DEPARTMENT.**

*Competency based curriculum end of term examination 2023*

**Uganda Lower secondary certificate of education. (U.L.S.C.E)**

***Instructions.***

- Attempt ***all*** the questions in section **A** and section **B**
- Diagrams where necessary must be drawn using a sharpened pencil.

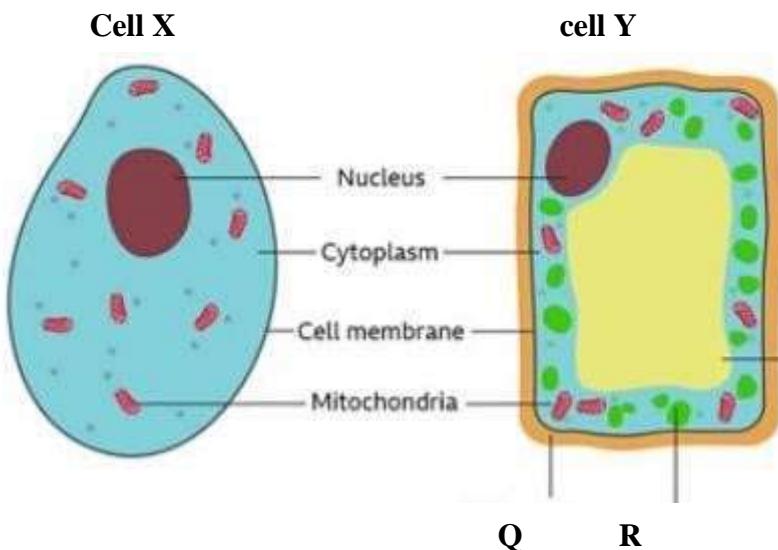
**For Examiners use only**

Question	Marks.	Comment
1		
2		
3		
4		
5		

## SECTION A.

*Attempt all the questions in this section*

1. A **cell** is the smallest basic functional building unit of all living organisms. While studying about the structure of cells, one group of S.1 students obtained a piece of epidermis from a fleshy leaf of an onion bulb and another group of students obtained cheek cell and placed each under separate microscopic slides. They observed the structure of the epidermal cell and cheek cell under low and medium power objective. The cell structures observed were drawn by students typical to cells **X** and **Y** as shown below.



(a) Which of cells **X** and **Y** is typical to

- (i) epidermal cell of onion bulb.

**(01 mark)**

- .....  
(ii) cheek cell.

**(01 mark)**

(b) Use the parts indicated on both cells **X** and Cell **Y** and fill in the spaces below.

**(04 marks)**

.....is semi-permeable membrane enclosing cell contents. Its function is controlling the movements in and out of the cells.

The jelly -like substance in which chemical processes are carried out in the cells above is

.....is an organelle where food is broken down to release energy in the cells, a process called respiration.

.....controls all the activities taking place within the cells.

(c). Name part of cell **Y** labelled, *(02 marks)*

(i). **Q** .....

(ii). **R**.....

(d). State the function of parts on cell **Y** labelled,

(i). **Q** *(01 mark)*

.....

.....

(ii). **R** *( 01 mark)*

.....

.....

(e). Other than parts **Q** and **R** named in (c) above, state other two structural differences between cells **Q** and **R** *( 02 marks)*

.....

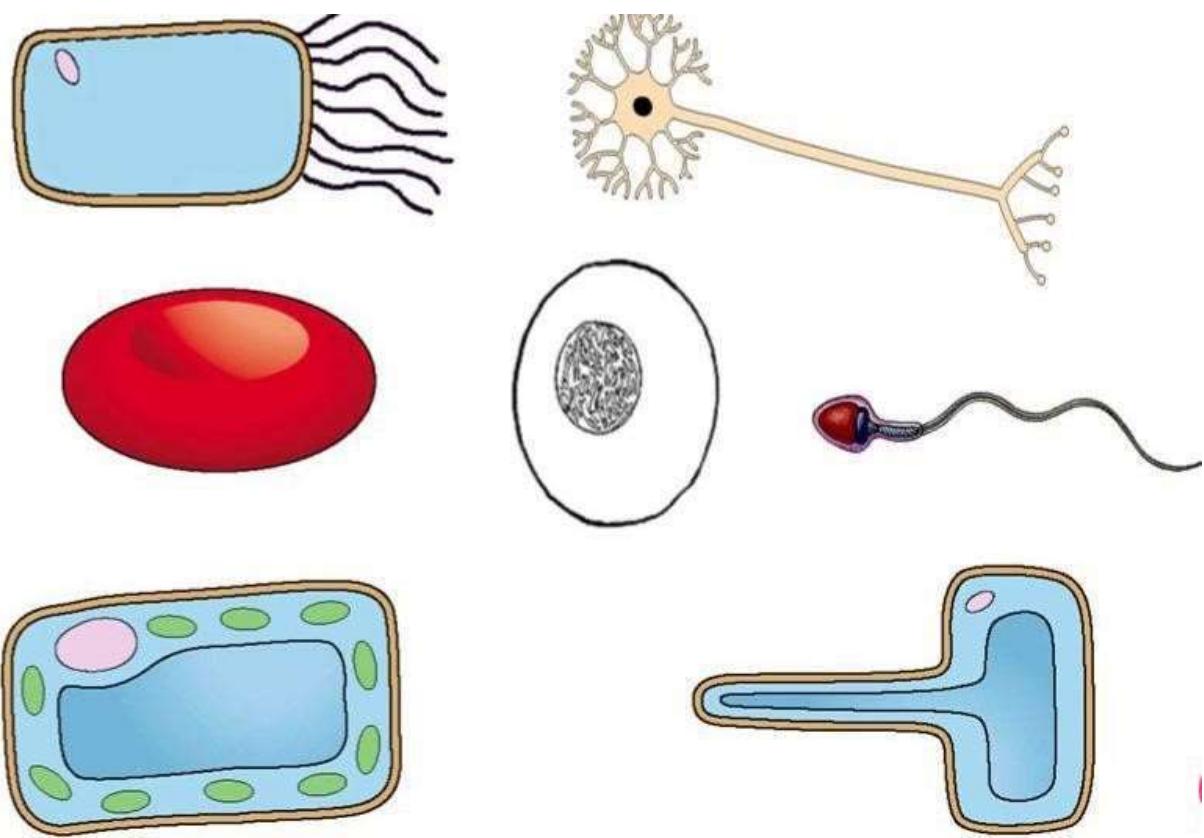
.....

.....

2. Multicellular organisms are made of many kinds of special cells called **specialised cells**. Below are different structures of **specialised cells** found in some multicellular organisms. Use them and answer the questions that follow.

**Cell C**

**Cell N**



**Cell E**

(a) State what is meant by “*specialized cell*”

**cell R**

(01 mark)

.....  
.....

(b) Name the specialised cell labelled,

(04 marks)

(i) C.....

(ii) N.....

(iii) E.....

(iv) R.....

(c) From the diagrams above; state the *adaptation* of the specialised cells to their functions.

(i). **Cell C**

(02 marks)

.....  
.....  
.....

(ii) Cell E

( 02 marks)

.....  
.....  
.....

(d) State the function of **cell R** in man.

(01 mark)

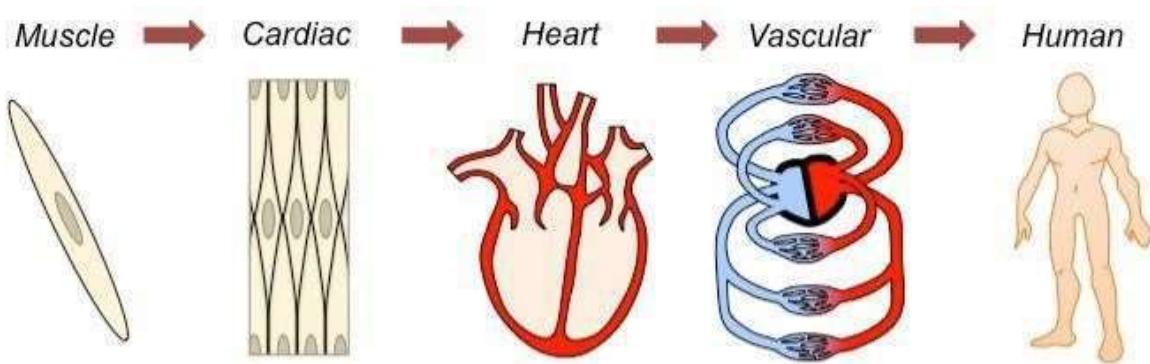
.....  
.....

(e) Three specialised cells above are not labelled with letters. Identify and **mark the specialised cell** with a letter which corresponds to its name as given below.

( 3 marks)

- Egg cell (Ovum) ----- Z
- Red blood cell..... W
- Sperm cell..... M

3. The life processes of the human body are maintained at several levels of structural organisation. Below are diagrams showing different levels of organisation in man. Use them and answer the questions that follow.



Cell-----> level T -----> level S-----> level V-----> level O (a) Name the labelled levels of structural organisation in man, ( 04 marks)

(i) Level T.

.....

(ii) Level S.

.....

(iii) Level V.

.....

(iv) Level O.

.....  
.....  
.....  
.....

(b) State the function of the following in the human body. **(02 marks)**

(i) Muscle cell.

.....  
.....  
.....

(ii) heart.

.....  
.....  
.....

(c) Of what importance is the **vascular** structure belonging to **level Y** in man.

**(01 mark)**

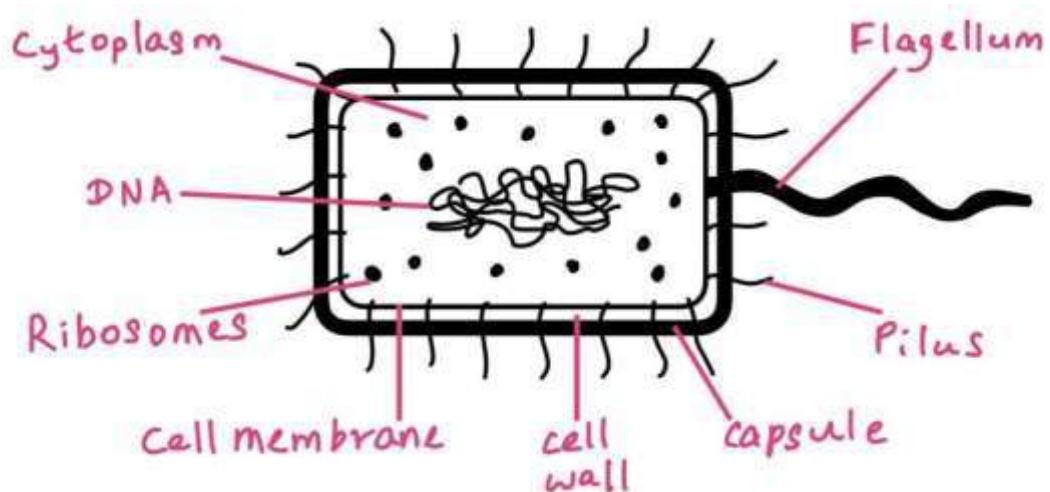
.....  
.....  
.....

## SECTION B.

*Attempt questions in this section.*

*All questions carry equal marks.*

4.(a) Among the very many major challenges for health care systems is **infectious prevention and control**. (I.P.C) for infectious diseases. Infectious diseases are caused by harmful organisms (**pathogens**) that enter our bodies from the outside. The ministry of health organized a one-day workshop in your school to sensitize you about infectious diseases. One of the posters pinned around the workshop had the structure of a **pathogen** below.



- (i) Name the pathogens whose structure is shown above. **(01 mark)**  
(ii) State the kingdom to which the pathogen named in (i) belongs. **(01 mark)**

- (iii) State three general features of the pathogens whose structure is shown above. **(03 marks)**
- (iv) Name three infectious diseases caused by the pathogens whose structure you shown above. **(03 marks)**
- (v) As a biology student who attended the infectious prevention and control (I.P.C) workshop about the pathogens whose structure is drawn above; suggest ways how each of the infectious diseases named in (iv) can be controlled in your community **(03 marks)**
- (b) Advancements in technological microbiology started to draw the attention of the market when products originating from microbial activity of above pathogens began to be required by man on a large scale.  
State how bacteria are used in a number of ways basing on their natural metabolic capabilities. **(04 marks)**

**5.** One S.1 student; John Speke asked his fellow class members that “how comes organisms in the world have different names according to people’s languages”

He gave an example and said that a dog in Acholi is called ‘Gwok’, ‘Mbwa’ in Luganda and ‘Embwa’ in Runyankole.

Another S.1 student; Lucky Peace said that each organism in the world has a scientific name originating from two Latin words which name is recognized in the whole world.

She added and said that for example, a **DOG** is known as *Canis familiaris*.

- (a) Explain the following terms **(5 marks)**
- (i) Classification
  - (ii) Taxonomy
  - (iii) Species
  - (iv) Genus
  - (v) Binomial nomenclature
- (b) Name the major taxonomic unit or levels of classification used in classifying organisms **( $3\frac{1}{2}$  marks)**
- (c) In the scientific name given by Lucky Peace, identify a;
- (i) Species name **(1 mark)**
  - (ii) Genus name **(1 mark)**
- (d) Identify any **two** importance of classifying organisms. **(2 marks)**
- (e) Name any **five** kingdoms that exist among organisms. **( $2\frac{1}{2}$  marks)**

**END**

Candidate's Name: .....Signature: .....

553/1

## BIOLOGY

Paper 1

2024

2 $\frac{1}{2}$  hours



# B.PETER'S ACADEMIC PLATFORM

## UGANDA LOWER SECONDARY CERTIFICATE OF EDUCATION

### ASSESSMENTS TO CANDIDATES

BIOLOGY PAPER 1

THEORY SENIOR

FOUR

B.PETER'S ACADEMIC PLATFORM

### INSTRUCTIONS TO CANDIDATES:

This paper consists of **several** examination items.

Answer all items for your good academic performance all.

**B.PETER'S MEDIA KAGADI UG**

Tel: **0771565972** OR **0782353092**

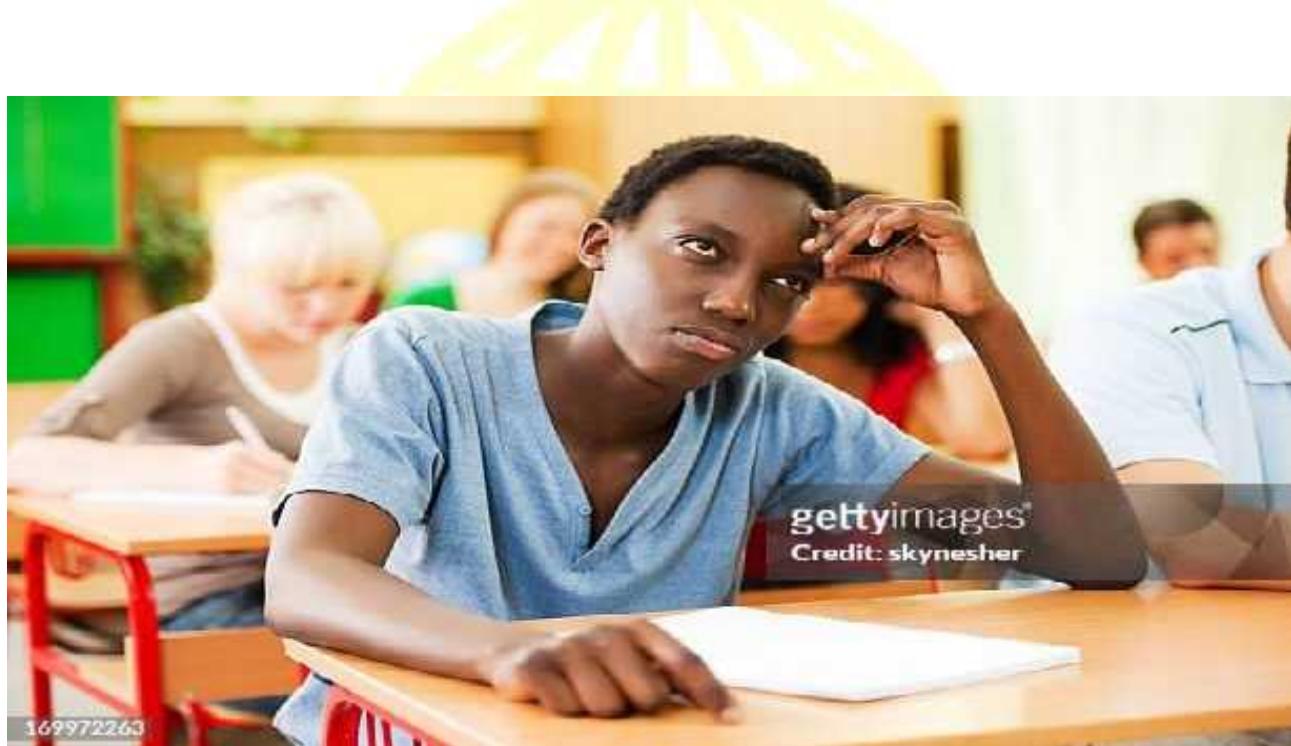
'Yesterdays failures are today's seeds that must be diligently planted to be able to abundantly harvest tomorrow's success'

## SECTION A

Answer **all** the items in this booklet.

### Item 1.

While in a Biology lesson, Mr. Mutyaba informed all learners that the biological hierarchy relates with the different political administration levels in Uganda. In this scenario, he used man as an example. Kyomuhendo Peter, one of the students in Mr. Mutyaba's class has found a challenge in relating the concept.



**Fig.1** shows Peter confused in the Biology lesson.

### Task

- (a). As a wise Biology student, help Peter to identify both the biological hierarchies and the political administrative levels that Mr. Mutyaba was talking about. (04 scores)
- (b). Further help Peter to outline the biological hierarchy for classification of man. (04 scores)

(c). Explain to Peter why it would be important to classify man. (02 scores)

### **Item 2.**

Racheal and John, a couple in Kyengera town has in most of the cases suffered from unplanned births that have made them go into unplanned expenses. The couple plans to have another pregnancy and has decided to visit Nsangi Referral Hospital. Dr.Sennyonga, a medical doctor at Nsangi Referral Hospital informs the couple that their challenge has always come in due to their failure to understand and interpret the dynamics of the Oestral cycle. He informs them that it is incorporated by the changes in the hormonal levels in blood. Dr.Sennyonga receives an emergency call that invites him to attend to an important ceremony on which he is the Guest of Honor. This leaves the couple in suspense.



**Fig.2** shows Racheal and John consulting Dr.Sennyonga.

### **Task**

As a Biology learner;

(a). Help Racheal and John understand the events that occur during the Oestral cycle. (05 scores)

(b). Explain to the couple the hormones involved in the Oestral cycle and their effects. (05 scores)

### Item 3.

Mr.Kyabaggu,a PhD Biology student at Mbarara University of Science and Technology was instructed to carry out a research thesis on the impact of drought on plant growth, a case study of Karamoja Grass land Ecosystem in Karamoja. He considered the resistance to drought of the tree species in relationship with the number of tree species. He was able to plot the graph below but he has found a problem with interpreting the graph.

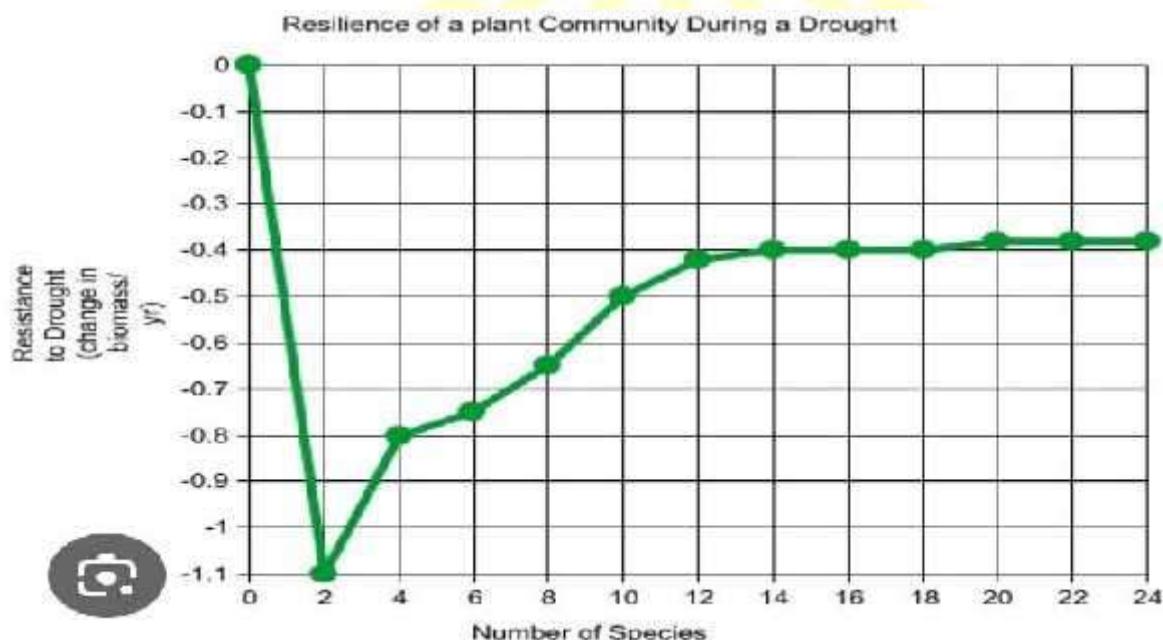


Fig.3 shows Mr.Kyabaggu's graph.

### Task

As a Biology literate;

- Identify both the dependent and independent variable Mr.Kyabaggu could have considered in his thesis.(02 scores)
- Help Mr.Kyabaggu to come up with the description of the shape of his graph.(04 scores)

#### Item 4.

In Jinja town council, many mothers have failed to understand how sex linkage occurs in humans. On one of the talk shows on BaBa FM, Dr.Nabeeta,a gynecologist from Jinja Main Hospital tried to explain how the phenomenon occurs. On a sad note, Mutesi, a resident in the same town only heard the conclusive statement “sex chromosomes also carry genes and these control characters that can be inherited along with sex. These are known as sex linked characters.”

#### Task

Explain to Mutesi how this phenomenon occurs in humans. (25 scores)

#### Item 5

As a pre-requisite for joining Harris International Food processing Factory in Kawempe, a suburb in Kampala Metropolitan area, the job applicants are tested and in most of the cases some of them have shown symptoms of respiratory disorders. Other organisms like fish, insects, plants and amphibians in the same area also show signs and symptoms of respiratory disorders. The Public Health officials from Mulago Hospital suspect that the high concentration of factories in Kampala Metropolitan area could be responsible for the increased respiratory disorders faced by people in Kawempe.

#### Task

Explain to the residents of Kawempe how the high concentration of factories in Kampala Metropolitan area might be affecting gaseous exchange of all organisms present in Kawempe region. (25 scores)

#### Item 6.

Amulen and Lukwago, both visited Nakasero blood bank to know their blood types. On reaching there, Dr.Achen showed them a chart that beared both the blood types and antibodies shown below

<b>Blood Type</b>	<b>Antigens on rbc's</b>	<b>Antibodies in blood</b>	<b>Safe transfusions</b>	
			<b>To</b>	<b>From</b>
A	A	B'	A, AB	A, O
B	B	A'	B, AB	B, O
AB	A, B	-	AB	A, B, AB, O
O	-	A', B'	A, B, AB, O	O

(Extracted from [www.mun.ca](http://www.mun.ca))

She further explained to them that when two individuals with non-complementary blood groups share blood, it has about 85% chances of agglutinating. She added that this challenge can be overcome by drafting a cross match table before any transfusion of blood can take place which she never drafted for them.

### Task

Construct a well referenced cross match table that would be considered in any hospital to enlighten Amulen and Lukwago about the matter. (25 scores)

### Item 7.

Annually, Uganda's Ministry of Education and Sports sends sports representatives to International Game competitions. Whereas the most popular sports like athletics, kick boxing, weight lifting among others are always represented by many Ugandan participants such as Kiprotich and Chiprimo, Uganda wins extremely very few medals. Majority of the Ugandan participants blame their failure to bring victory back home on different factors such as Limited training time and changes in the weather patterns. It has been observed that those who win medals have a good training plan and a commendable stable weather pattern. Of recent, the medal winners in the last competitions had previously failed to win due to muscle issues until when they beefed up their training. In a bid to improve sports performance in Uganda, the National Council of Sports is intending to roll out a programme of educating the sports people on the muscle-bone interactions.

### Task

Write a letter to the Chairperson of The National Council of Sports, explaining why sports

people should pay much emphasis to muscular fitness, to improve muscle-bone interactions for better results. (25 scores)

### Item 8

During leisure time on Sunday, students of St. Elizabeth Nkoowe watch programs on wild life T.V channel. On day, they saw a lion chasing a giraffe and they were very much excited. The lion took two minutes to capture the giraffe. As a student of biology, attempt the following questions;

- (a) Explain any four-life processes that were expressed in the above scenario. (08marks)
- (b) Giving a reason, identify which organism is a predator. (02marks)

### Item 9

Botanists and zoologists claim that plants and animals depend on each other. Zoologists noted that animals depend on food made by plants but botanists did not explain how plants depend on animals. As a senior three student; explain briefly how;

- (i) Plants obtain energy for making their own food. (02marks)
  - (ii) Plants depend on animals for their survival. (02marks)
- (b) Apart from the food which animals obtain from plants, describe different ways how the process by which plants make their own food is important in nature.(02marks)

### item 10

In preparation for an inter-house competition, Chesang, a 40 kg female athlete ate a meal containing 470 g of carbohydrates in the morning. She believes the meal will help her perform better during the competition. However, her young brother does not seem to understand how the meal will contribute to Chesang's success.

Chesang finally won the competition but experienced muscle cramps. She rested for 20 minutes; returned home walking but the brother wondered how she still had the strength to walk home after the competition.

[*The recommended daily carbohydrate intake of a 40 kg female athlete is (280 – 480 g)*]

#### Task

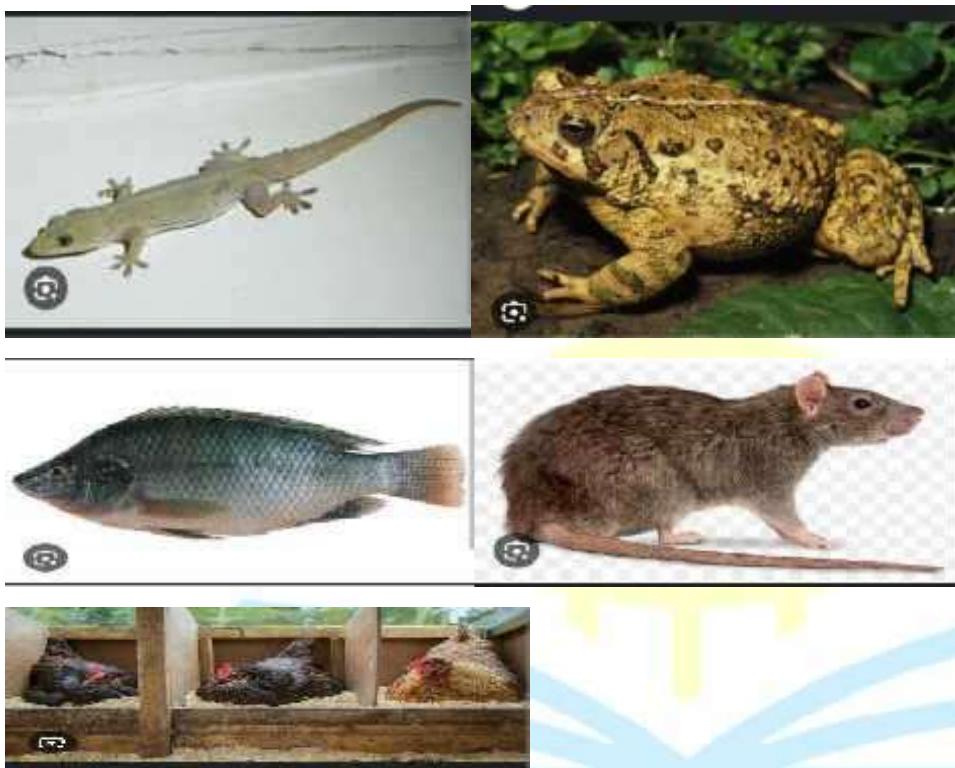
Explain to Chesang's brother the processes that the meal she ate went through to enable her win the race, be able to come back home and how her body regained the normal state (20 scores)

### Item 11

Otim a S.2 student ate a meal consisting of an egg and cooked cassava during breakfast. After eating his breakfast, Otim went back to class for his mid-morning lessons. As a student who has acquired knowledge about how animals obtain their food, ingest it ,digest it and final products of digestion absorbed help Otim understand how the meal he ate was broken down in the body until when the final products of digestion were absorbed. (20 scores)

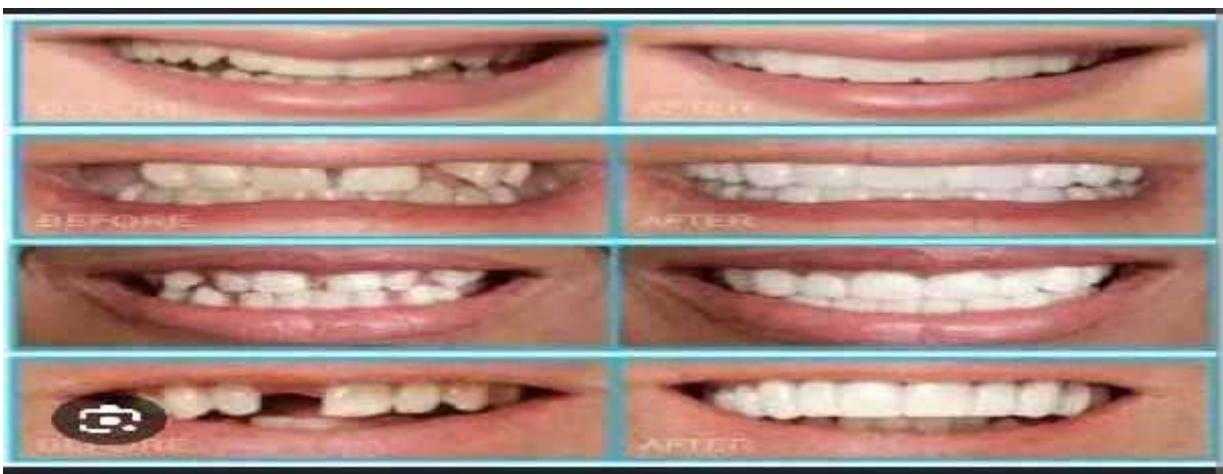
item 12

Organisms are grouped according to similarities and differences in Their characteristics. Use characteristics of skins, eggs and methods of Temperature regulation only. Classify Rat, Tilapia, Lizard, Hen and Toad into classes of phylum Chordata.



Item 12

Kirabo Irene a young Senior one girl who lives in Kyabugahya and goes to Kagadi Progesive S.S in Kagadi. She usually denied her mum on visitation day because of her appearance and always claimed that she is a worker at their home and warned her before her friends at school on a certain Visitation Day, never to visit her again lest she face something she would never regret. On her death bed, mum wrote to her a note that in brief Read, "my daughter, your dad raped me and caused me to leave school. He Fought had to force me abort the pregnancy and I refused over and over again. He one day go to pair of pliers and plucked out my teeth one by one and warned to finish the mall and after to kill me had I resisted to abort. I ran from him and finally gave birth to a nice looking daughter which is you. Brenda is now studying to be a dentist. She has a photo of her mum before and after the loss of her teeth and a model for a complete set of teeth in the normal adult, together with the dental formula showing the number of teeth in the upper and lower half of the jaw.



### Task

As a learner who is more knowledge able in dental care,  
Write a letter to Kirabo addressing each of the following concepts she would  
Want to understand better.

- i) Simple advice on how one can care for the teeth to prevent stigma like that mum Lucy was going through including the type of food that mum Kirabo was no longer comfortable of eating after loss of some of her teeth
- ii) How to identify the different types of teeth in the human oral Cavity basing on their features and the function of each teeth type
- iii) Using the dental formula given to calculate the total number of teeth in the lower and upper jaw of the mouth and after calculate the total number of teeth in the human mouth.

### Item 13

A learner put a spatula end full of soil in a clean test tube, and then Added water to just cover the soil, The student then added 5 drops of universal indicator and had to shake thoroughly and filtered the mixture into test tube.  
The procedure was repeated with other more two soil samples.





- a) Identify the property of the soil being investigated?
- b) Suggest how the student used the filtrates to determine the property of the soil mentioned in (a) above
- c) What is the importance of testing the property of the soil to a farmer?

#### Item 14

At breakfast and evening tea, your school provides milk and cooked Cassava to the learners as suggested by the government of Uganda.

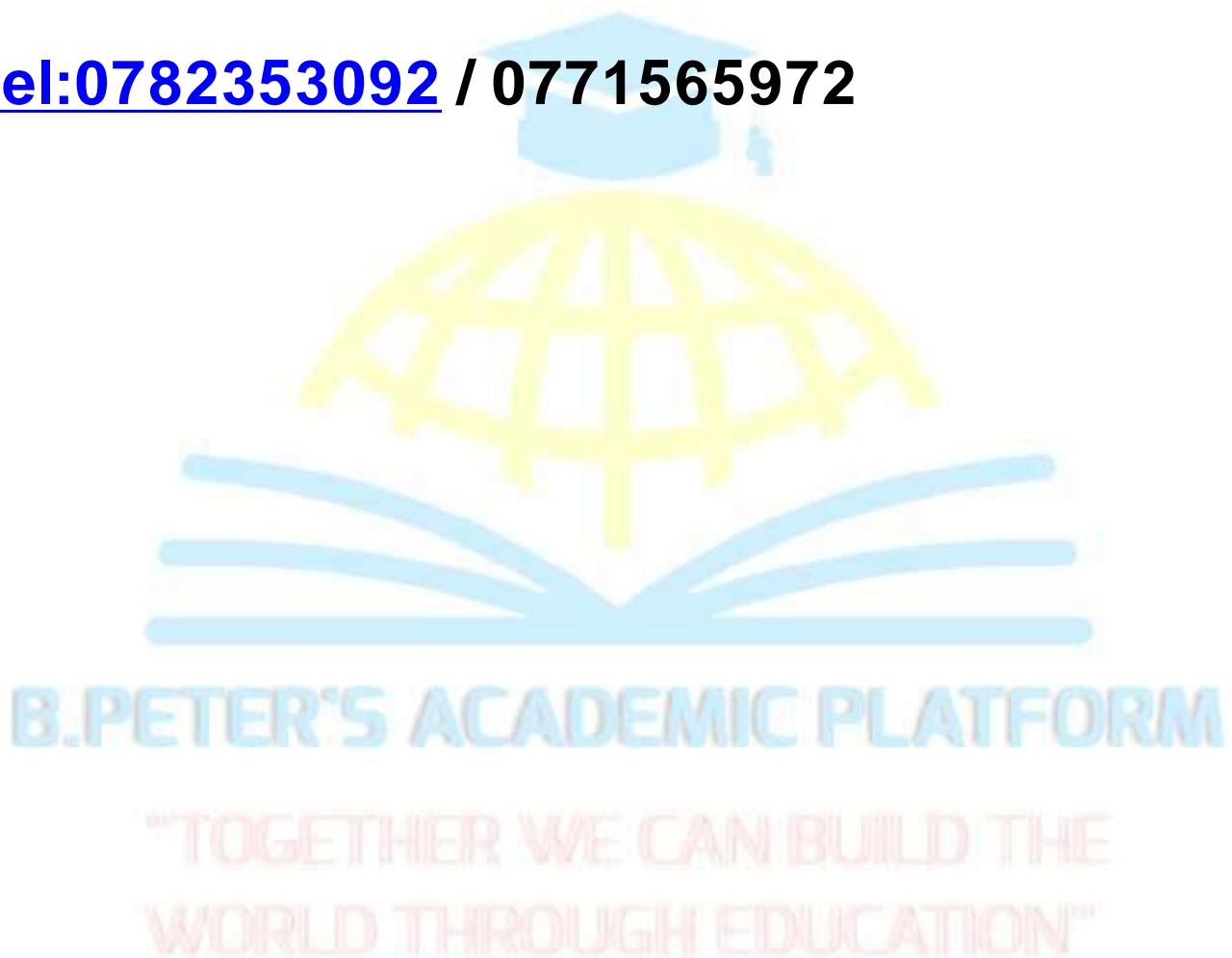


- a) Name the food nutrients that the school mess provides to its learners at breakfast

b) Some learners after eating this kind of food, they complain of overeating and end up missing lessons due to sleeping in class. Explain why do learners doze off after having some meals.

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## **MANDELA SECONDAARY SCHOOL, HOIMA**

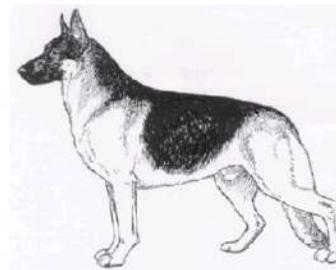
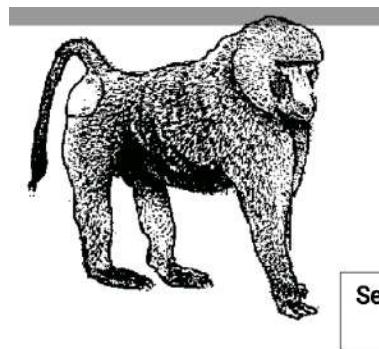
### **S.1 BIOLOGY WORK**

1. You are a student of Mandela Secondary school and you have been learning about living things. The communities in your neighbourhood in the village are having problems with monkeys in the nearby forest reserve. These animals have destroyed maize plantations and the people are planning to poison all the monkeys.

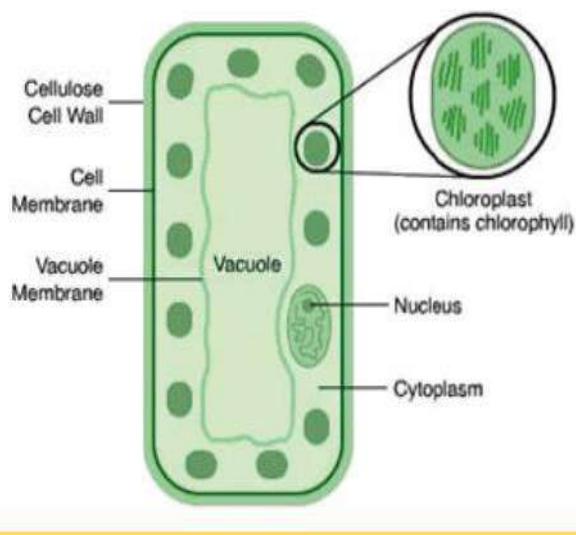
Task: using your knowledge of life processes, design a poster involving all the four living things to raise awareness to the public about the need to conserve and protect living things.



2. You are a member of the nature club at your school. The club is developing an environmental campaign for members of a community that lives next to a forest which is a home to a troop of baboons. The baboons regularly destroy the crops in the community's gardens. The community members plan to get rid of the baboons permanently. The nature club has to raise awareness about respect for living things. You are given these four organisms and you are to elaborate a message showing their relation.



3. You have been asked to give a talk to the P.7 class of your former school. The talk is about importance of plants to man. The P.7 class already knows that the plants make food, but they do not know the details of the structures involved in the process. Your task is to write down (in not more than 100 words) how you would explain this in your talk using your knowledge of biology. You can use the image below during your talk.



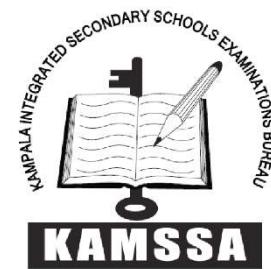
# SEROMA CHRISTIAN HIGH SCHOOL



## SENIOR ONE 2020 BIOLOGY ACTIVITY 1      *3<sup>rd</sup> April, 2020*

### **Subtopic: *Areas where the Knowledge of Biology is applied***

1. Using the knowledge, understanding, skills, values and attitudes attained from the study of Biology and its application in the day to day life;
  - (i) identify the careers where the knowledge of biology is applied that are affected by the current pandemic condition of corona virus in our country and explain how each career is affected.
  - (ii) identify the careers that are being involved in the struggle of curbing the covid-19 pandemic in Uganda and explain how each is being involved.
  - (iii) explain how the various branches of Biology can be used by the ministry of health and the community to fight covid-19.



**KAMSSA LOWER SECONDARY LEVEL EXAMINATIONS  
BIOLOGY  
SENIOR ONE  
END OF YEAR 2022  
2 Hours**

**THIS PAGE IS FOR EXAMINER USE ONLY**

**Do not write in the boxes on this page. The examiner will use them to keep a record of your marks.**

<b>SECTION A</b>									
<b>Question</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>8</b>	<b>Total</b>
Max marks	4	5	6	8	4	4	5	4	40
Actual marks									
<b>SECTION B</b>									
<b>Question</b>	<b>11</b>	<b>12</b>	<b>13</b>	<b>14</b>	<b>15</b>	<b>16</b>			<b>Total</b>
Max marks	15	15	15	15	15	15			60
Actual marks									

#### **Instructions**

This paper consists of two sections; Section A (**40 marks**) and Section B (**60 marks**).

- Section A consists of 08 structured questions. Attempt all questions in this section by filling the answers in the spaces provided.
- Section B consists of six extended short essay questions. Attempt any four questions from this section. Answers to questions in this section must be written on separate booklets provided. All questions in this section carry equal marks

#### **SECTION A (40 MARKS)**

**1a).** The term biology was derived from two greek words ‘Bios’ meaning.....and ‘logos’ meaning .....(02 marks)

Therefore; biology is the branch of science that deals with the study of .....(01 marks)

**b).** ..... and ..... are the two major branches of biology.  
(02 marks)

**2.** Living organisms in the community exhibit different life process. Choose the most correct life process and fill it in the blank spaces provided below. (05 marks)

- i) ..... is the process by which living organisms give rise to young ones of the same kind.
- ii). ..... is the process by which living organisms get rid of harmful products of chemical reactions of metabolism.
- iii). Living organisms such as animals move their whole body in search of food, shelter, mates or to escape from danger. This is known as .....
- iv). ..... is the process by which living organisms feed on materials from the environment and make them part of their body or use them to provide energy.
- v). ..... refers to the irreversible permanent increase in size of an organism.  
(Locomotion, feeding, Reproduction, Excretion, Growth)

**3.** You are provided with cells A and B as shown below.

Figure 1

figure 2



1010jiajiao.com

a). Identify cells in figure 1 and 2 (02 marks)

- i) Cell in figure 1.....
- ii) Cell in figure 2 .....

b) State the parts labeled A, B and C (03 marks)

- i) A.....
- ii) B.....
- iii) C.....

C) State any two roles of part labeled C to the above cells. (02 marks)

.....  
.....  
.....  
.....

4. Plants and animals are groups of living organisms that makeup the community. State any four differences between plants and animals. (04 marks)

PLANTS	ANIMALS

5. Senior one students during one of their biology lesson examined some micro organisms obtained from pond water in their school garden using magnifying instruments studied in the biology obtained from laboratory.

i) Which branch of biology deals with the study of micro organisms? (01 marks)

.....  
.....

ii) Identify any two magnifying instruments in the laboratory that were used in the lesson. (02 marks)

.....  
.....

iii) Suggest any two-biological importance of microorganisms in our community. (02 marks)

.....  
.....

6. The table below shows the diagrams of the specialised cells. Fill in their functions in the blank areas in the table. (05 marks)

SPECIALISED CELL DIAGRAMS	FUNCTION OF A SPECIALISED CELL

7. Joan, a senior one student kept bread in her suitcase for a long period of time. Later she observed the bread moulds on her bread while using a hand lens and microscope.

i) State the kingdom to which the bread moulds above belong. (01 mark)

.....

ii) Suggest any other two organisms which belong to the same kingdom above.

(02 marks)

.....  
.....  
.....

iii). Give three economic importance of organisms in the kingdom above.

(03 marks)

.....  
.....  
.....

8. Organisms are grouped using scientific names. Complete the table below by filling in the appropriate answers.

(03 marks)

ORGANISM	GENUS NAME	SPECIES NAME	SCIENTIFIC NAME
Cockroach	Periplaneta	americana	..... .....
Man	Homo	.....	<u>Homo sapien</u>
Bee	.....	mellifera	<u>Apis mellifera</u>

### **SECTION B (60 marks)**

#### **Attempt any four questions**

9. The diagram below shows two common organisms in our community.



a). Identify the kingdom to which they belong. ( 01 marks)

b (i) State the phylum to which they belong. (01 marks)

ii) State three reasons for your answer in b (i) above (03 marks)

c) Why are the above organisms considered insects? (03 marks)

d) What are the economic importance of insects in our communities. (07 marks)

10. In the year 2020, there was a global outbreak of a viral disease which threatened the lives of many people worldwide. Research shows that this pandemic began in China and spread to other parts of the world.

i) Identify this viral disease. (01 mark)

ii) State the name of the virus responsible for the viral disease. (01 mark)

iii) Identify any five signs and symptoms that were shown by the individuals that succumbed to the viral disease. (05 marks)

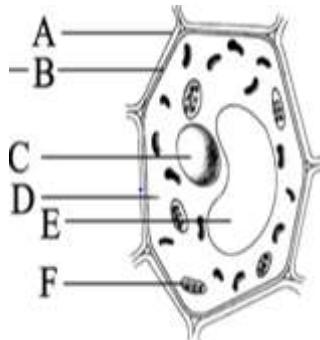
iv) Suggest any eight interventions that were made by the government of Uganda to eradicate the pandemic. (08 marks)

11. Microbiology refers to the study of micro organisms. However some of these organisms are unicellular and can be seen clearly using magnifying instruments.

ai) Define the term magnification as used in the study of micro organisms. (02 marks)

ii) Suggest any two examples of magnifying instruments that can be used in the study. (02 marks)

b) The figure below was observed by senior one biology students as they examined appearance of onion cells under a microscope. Carefully study and use it to answer the questions that follow.

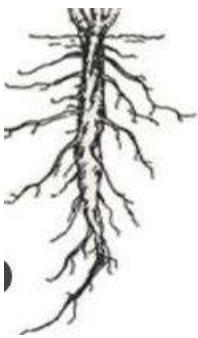


i) name the parts labeled A to F. (06 marks)

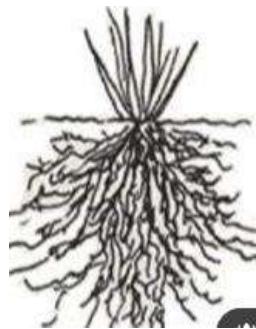
ii) Suggest the function of the parts labeled A to E. (05 marks)

12. Peter a farmer in Luweero district planted maize and beans in his farmland. At the end of the season, he harvested his crops in preparation for the next season. However he observed the root systems from each of the plant. The root systems are shown below. Study them carefully and answer the questions that follow.

**Figure A**



**Figure B**



a) Identify the type of root system in

(i) figure A (01 mark)

(ii) Figure B (01 mark)

b) Identify the plant from Peter's farm that possesses root system in

(i)figure A (01 mark)

(ii) Figure B (01 mark)

c) identify the type of farming Peter is practicing on his farm. (01 mark)

ii) Suggest the advantage of the above farming method. (01 marks)

d)(i)state any five root modifications you know. (05 marks)

ii) Roots are essential parts of the plant. Suggest any four functions of roots to a plant. (04 marks)

13. Some students from S.2 biology group X made some research about the organisms in their school garden. They found out that the school garden was a habitat to a number of living organisms.

## **RESEARCH FINDINGS**

They observed some mushrooms growing in areas with a lot of decomposing organic matter, squirrels entering holes in the garden soil, filamentous spirogyra in pond water flowing through the garden, bacteria on decomposing matter and leafy amaranthus plants growing as weeds.

- ai) identify the kingdom to which each organism in the above garden belongs. (05 marks)
- (ii) Suggest the reason why mushrooms were found growing in areas with a lot decomposing organic matter. (02 marks)
- bi) state any three characteristics of organisms belonging to the same kingdom where the mushrooms belong. (03 marks)
- ii) State any five biological roles played by the squirrels and other organisms that live in the soil.(05 marks)

14. The list below shows a group of items. Study it carefully and answer the questions that follow.

### **List**

Red blood cell, liver, platelets, lungs, white blood cells, root, flower, platelets, shoot, guard cells, pancreas, epidermal cells

- ai) identify those items which belong to animals. (05 marks)
- (ii) Identify those items which belong to plants. (05 marks)
- b) Define the following terms as used in the levels of cellular organization. (05 marks)
- i) Cell
- ii) Tissue
- iii) Organ
- iv) System
- v) Organism

15. Life processes are necessary to all organisms in order to survive. Therefore different organisms exhibit different life processes which sustain their lives.

- i) State all the seven life processes exhibited by living organisms in nature. (07 marks)
- ii) State the importance of each of the life process shown in (i) above to organisms. (08 marks)
16. Both plants and animals are living organisms that make up our communities.
- i) State the reason why plant and animals are referred to as multicellular organisms. (01 mark)
- i) Identify any seven similarities between plants and animals. (07 marks)
- iii) State any seven differences between plants and animals. (07 marks)

End

Learner's Name .....

Stream ..... L.I.N. ....

CBC  
BIOLOGY  
Theory  
July 2022  
Senior One  
2 hours



## **FORMATIVE ASSESSMENT TOOLS FOR THE COMPETENCE BASED CURRICULUM BIOLOGY**

Theory  
Senior One  
**2 Hours**

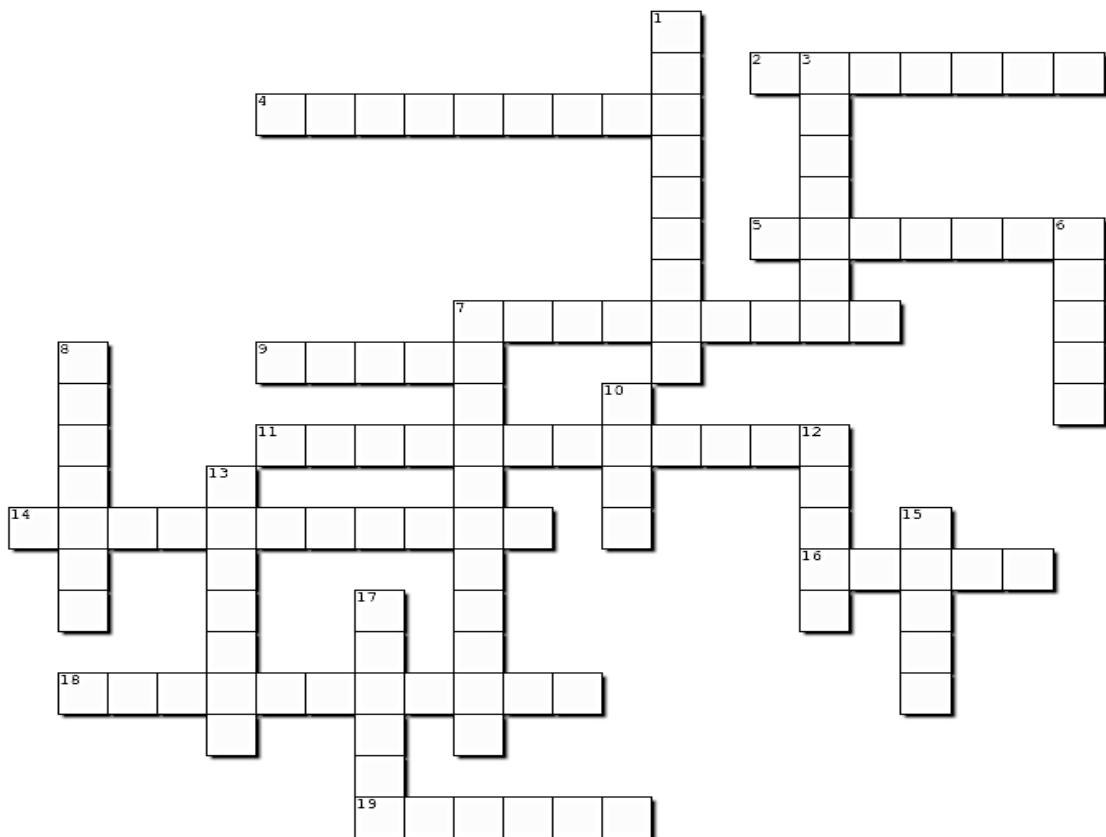
### **INSTRUCTIONS TO LEARNERS:**

- Answer all questions on this paper
- Write the answers to section A in spaces provided.
- Write the answers to questions in section B on a separate answer sheet to be fastened together with this question paper.

<b>For Teachers' Use Only</b>			
<b>Section</b>	<b>Question</b>	<b>Score</b>	<b>Examiner's Comments</b>
A	1		
	2		
	3		
B	4		
<b>Total</b>	<b>1-4</b>		
Identifier:		Descriptor:	

1. Figure 1 shows a crossword puzzle. Fill the puzzle as guided in the clue list. Choose the correct word from the list and write it across or down in upper case (capital) letters. Do not use pencil.

(20 marks)



Created using the Crossword Maker on TheTeachersCorner.net

CHITIN	CELLULOSE	CRUSTACEA	VIRUSES	MICROBIOLOGY	ZOOLOGY
YEAST	NYMPH	FEVER	CHLOROPHYLL	SPERM	NAUSEA
EUGLENA	BONE	CATERPILLAR	ETHANOL	TISSUES	ALGAE

#### Across

2. The product of yeast respiration used in making beer
4. A marine group of arthropods with large bodies and biting jaws
5. A flagellated protozoan showing photosynthetic feeding
7. The carbohydrate in cell walls of plants
9. The stage of metamorphosis between eggs and adults in grasshoppers and roaches
11. Study of small organisms
14. Process of transferring gametes in flowering plants
16. Male reproductive cells in animals
18. The destructive stage of a butterfly
19. The feeling of excessive desire to vomit; caused by disease

#### Down

1. A whip like rod used for movement in some bacteria and protozoa
3. Group of physically linked cells
6. A group of Protociliates closely related to plants
7. A pigment for capturing light in plant cells
8. Study of animals
10. The Calcified supporting tissue in vertebrates
12. Any unicellular fungus
13. Infectious particles closely related to living things
15. A clinical condition when the body is extremely hot
17. The main component of insect exoskeletons

Figure 1 : CBC Exam; Crossword Puzzle 1

## 2. Read the passage below and answer questions that follow.

26-year-old Jackie Ayebale is a mother of four children, two girls and two boys. The girls aged 8 and 6 were born with HIV. Ayebale learnt from her mistake and protected the boys aged 4 and 2 years from the deadly epidemic.

She gave birth to her first born not knowing her HIV status. When Ayebale became pregnant with the second born, she went to Bukulula Health Centre IV in Kalungu District for antenatal care where the health workers tested her for HIV. Her results were positive. Ayebale was advised to start treatment to avoid transmitting the virus to her unborn baby.

Unfortunately, she refused to adhere to the doctors' advice and threw away the tablet, hence transmitting HIV to her second born. "When I tested HIV positive, it took me 4 days to tell my husband. At the health facility, I was given some blue tablets to swallow every day but I threw them away," Ayebale, who is a farmer in Kyanagolo village explained.

She regretted her action and accepted the situation. Ayebale is now a champion of Elimination of Mother to Child HIV Transmission (eMTCT) in Kalungu and Masaka Districts. Her husband is HIV negative making them a discordant couple.

Upon agreeing to take antiretroviral virus drugs, Ayebale was able to conceive again, producing HIV negative babies. The smiling Ayebale is full of praises of the eMTCT services and very thankful to the health workers at Bukulula Health Centre who have been helpful and supportive.

Adapted from; <https://www.unicef.org/uganda/stories/26-year-old-hiv-positive-mother-learns-her-mistake-save-future-children-hiv>.

### Questions

From the passage;

- a. How did Ayebale know that she is infected with HIV? (2 marks)

.....  
.....

- b. Why is it necessary for pregnant mothers to test for HIV? (2 marks)

.....  
.....

- c. Which government program do you realize is helping in preventing HIV infections?

(2 marks)

.....  
.....

- d. What do you understand by the term **discordant** couple? (2 marks)

e. Which advise do you give to mothers who are at risk of transmitting HIV to their babies?

(3 marks)

.....  
.....  
.....  
.....

f. Ayebale's children are studying in a school like yours. How best can you live with these HIV positive students?

(5 marks)

.....  
.....  
.....  
.....  
.....

g. Suggest any effects of HIV to the;

i. Individual (2 marks)

.....  
.....

ii. Community (2 marks)

.....  
.....  
.....

3. Figure 2 shows a plant cell. Study it carefully and use it to answer questions that follow.

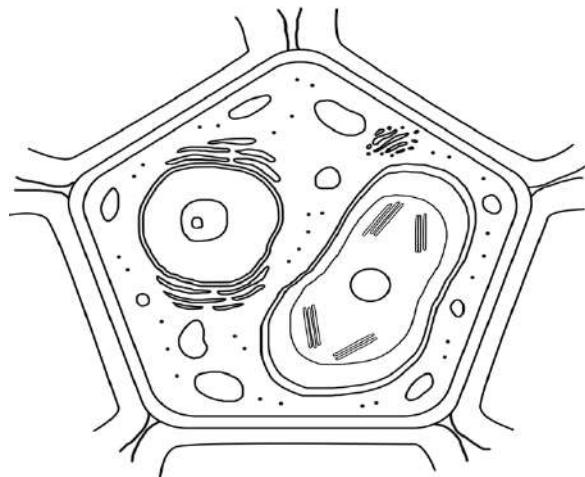


Figure 2 : Diagram of a plant cell

a. On the diagram, label and name the following parts. (5 marks)

- i. Cell wall
- ii. Sap Vacuole
- iii. Nucleus
- iv. Chloroplast
- v. Starch grain

b. In the table below, match the parts of the cell to their correct functions in the cell. (5 marks)

Part of the cell	Function
------------------	----------

<b>Cell wall</b>	Controls all cell activity
<b>Sap vacuole</b>	Stores water and dissolved solutes
<b>Chloroplast</b>	Provides support to the cell.
<b>Nucleus</b>	Stores food made by photosynthesis
<b>Starch grain</b>	The exact site for photosynthesis

c. Figure 3 shows the structure of the animal cell as seen under the microscope.

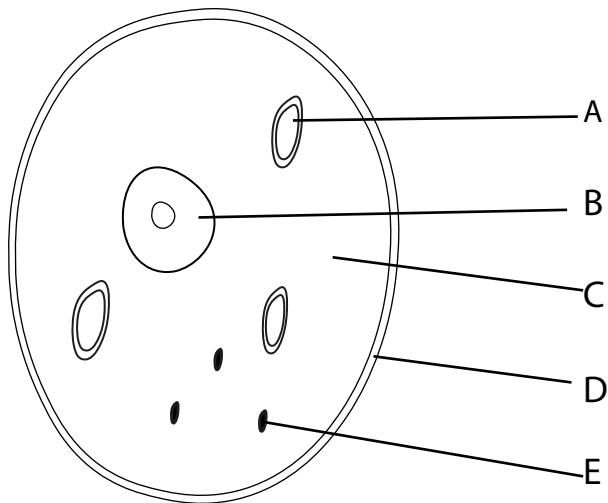


Figure 3: Diagram of an animal cell

i. Name parts labelled A to E (5 marks)

- A .....  
B .....  
C .....  
D .....  
E .....

iii. How are the cells in figure 2 and 3 different? (5 marks)

Cell in figure 2	Cell in figure 3

4. Figure 4 shows a collection of living things. Study the figure carefully and use it to answer the questions that follow.

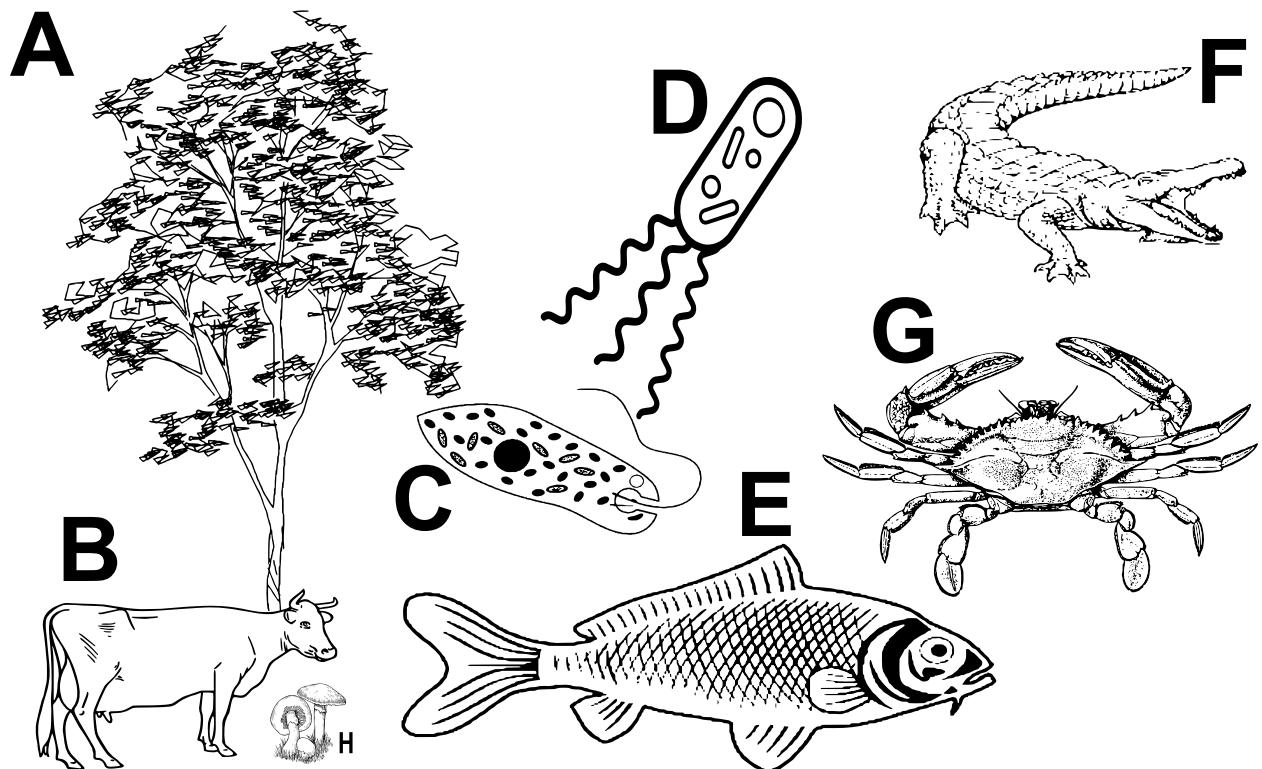


Figure 4: Collection of living things

- a. Suggest the kingdom of living things represented by the organisms in the letter;
- A. ....
- B. ....
- C. ....
- D. ....
- E. ....
- F. ....
- G. ....
- H. .... (8 marks)
- b. Name the class of vertebrates represented by;
- B. ....
- E. ....
- F. .... (3 marks)
- c. Organisms D, C and H; are studied in a branch of biology called Microbiology. Suggest the name of the branch of microbiology in which we study organisms like; (3 marks)
- D. ....
- C. ....
- H. ....

d. Organism A represents the most common subphylum of its kingdom.

i. Suggest a mode of propagation for this group of organisms. (1mark)

.....

ii. Name two prominent phyla of the sub-phylum you have mentioned in (d)(i) above. (2 marks)

.....

.....

e. Suggest the economic importance of organisms like D and H in nature. (3 marks)

D.....

.....

H.....

.....

END

Name:..... Stream:.....

**LCE  
S1 BIOLOGY  
November, 2023  
1 hour 30 minutes**



**LCE EXAMINATIONS 2023  
Uganda Certificate of Lower Secondary Education  
END OF YEAR ASSESSMENT 2023  
SENIOR ONE  
BIOLOGY  
1 hour 30 minutes**

**INSTRUCTIONS**

- The paper consists of **five** items. Each item carries equal scores.
- Attempt any **four** items. Use fresh sheets of papers.

1. The cow dung beetles play dead as their mechanism of avoiding danger. This often confuse children to think that they are non-living things.



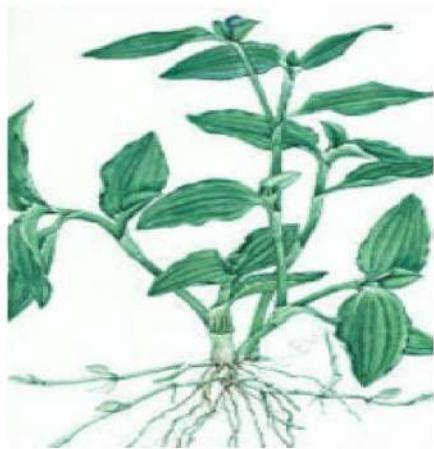
Explain the different life processes performed by structures on each of the three main body parts of the cow dung beetles. (10 scores)

2. The school store of beans has been invaded by unknown organisms as shown in the photograph below. This has left cooks stranded with what can be done to get rid of the organisms and secure beans for next term.



Write a message sensitizing cooks about the organisms and ways of getting rid of them?  
(10 Scores)

3. It's advisable to help parents with work during holidays. Assume you have been told to remove commelina (wondering Jew) from the garden of beans and you neither know commelina weeds nor the bean plants. Use their photographs to respond accordingly.



Photograph 1



Photograph 2

If you were told that the weed is the monocotyledonous plant, Compare the above photographs and hence identify the weed to be removed from the garden?

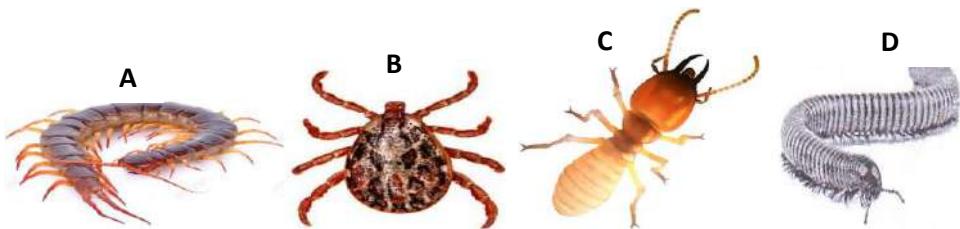
(10 Scores)

4. Members of the community in Karamoja are complaining about the harm caused by honey bees in their villages. Some of the village leaders have been convinced that actions should be taken to destroy the bees.



Write a whatsapp message to one of the community leaders, agreeing with harm caused by bees but requesting him to drop the idea of destroying bees and use them for their benefits  
(10 Scores)

5. S.1 biology students moved around the school compound, they collected the following organisms and returned with them to class.



Mark claimed that all the four organisms are insects but Esther said **NO** but she was not certain of the actual name to give to the group. Martin said each of these organisms belonged to a separate group although they shared certain features in common. Some of the class members rejected Martin's opinion and the whole class was set into an argument. Basing on observable features on the above organisms, and your knowledge of taxonomy. Provide relevant information which you could use to settle the argument in class      (10 scores)

**MERRY CHRISTMAS AND HAPPY NEW 2024**

Name.....personal no...../...../.....

Signature.....

553/1

**BIOLOGY.**

**S.1**

**C.B.C exam.**

**July/Aug-2022**

**1 ½ hours.**

**BIOLOGY DEPARTMENT.**

**I.Q.I.S.S.B**

***Competency based curriculum end of term examination 2022***

**Uganda Lower secondary certificate of education.( U.L.S.C.E)**

***Instructions.***

- Attempt ***all*** the questions in section A and ***only one*** question from section B
- Diagrams where necessary must be drawn using a sharpened pencil.

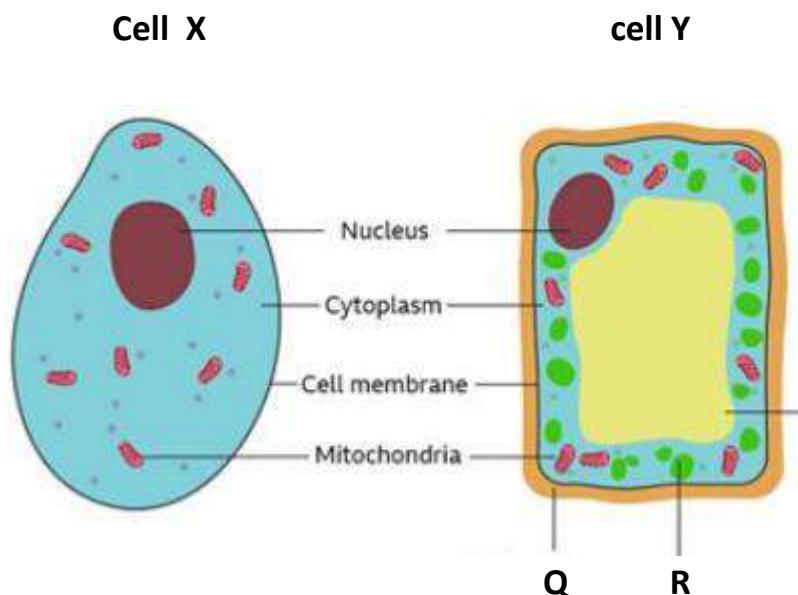
**For Examiners use only**

<b>Question</b>	<b>Marks.</b>	<b>Comment</b>
1		
2		
3		
4		
5		

## SECTION A.

**Attempt all the questions in this section**

1. A **cell** is the smallest basic functional building unit of all living organisms. While studying about the structure of cells, one group of S.1 students obtained a piece of epidermis from a fleshy leaf of an onion bulb and another group of students obtained cheek cell and placed each under separate microscopic slides . They observed the structure of the epidermal cell and cheek cell under low and medium power objective. The cell structures observed were drawn by students typical to cells **X** and **Y** as shown below.



(a) Which of cells **X** and **Y** is typical to

- (i) epidermal cell of onion bulb. ( 01 mark)

- .....  
(ii) cheek cell. (01 mark)

(b) Use the parts indicated on both cells **X** and Cell **Y** and fill in the spaces below. ( 04 marks)

.....is semi-permeable membrane enclosing cell contents. Its function is controlling the movements in and out of the cells.

The jelly -like substance in which chemical processes are carried out in the cells above is .....

.....is an organelle where food is broken down to release energy in the cells, a process called respiration.

.....controls all the activities taking place within the cells.

(c).Name part of cell **Y** labelled, (02 marks)

(i).**Q** .....

(ii).**R**.....

(d).State the function of parts on cell **Y** labelled,

(i).**Q** (01 mark)

.....

.....

(ii).**R** ( 01 mark)

.....

.....

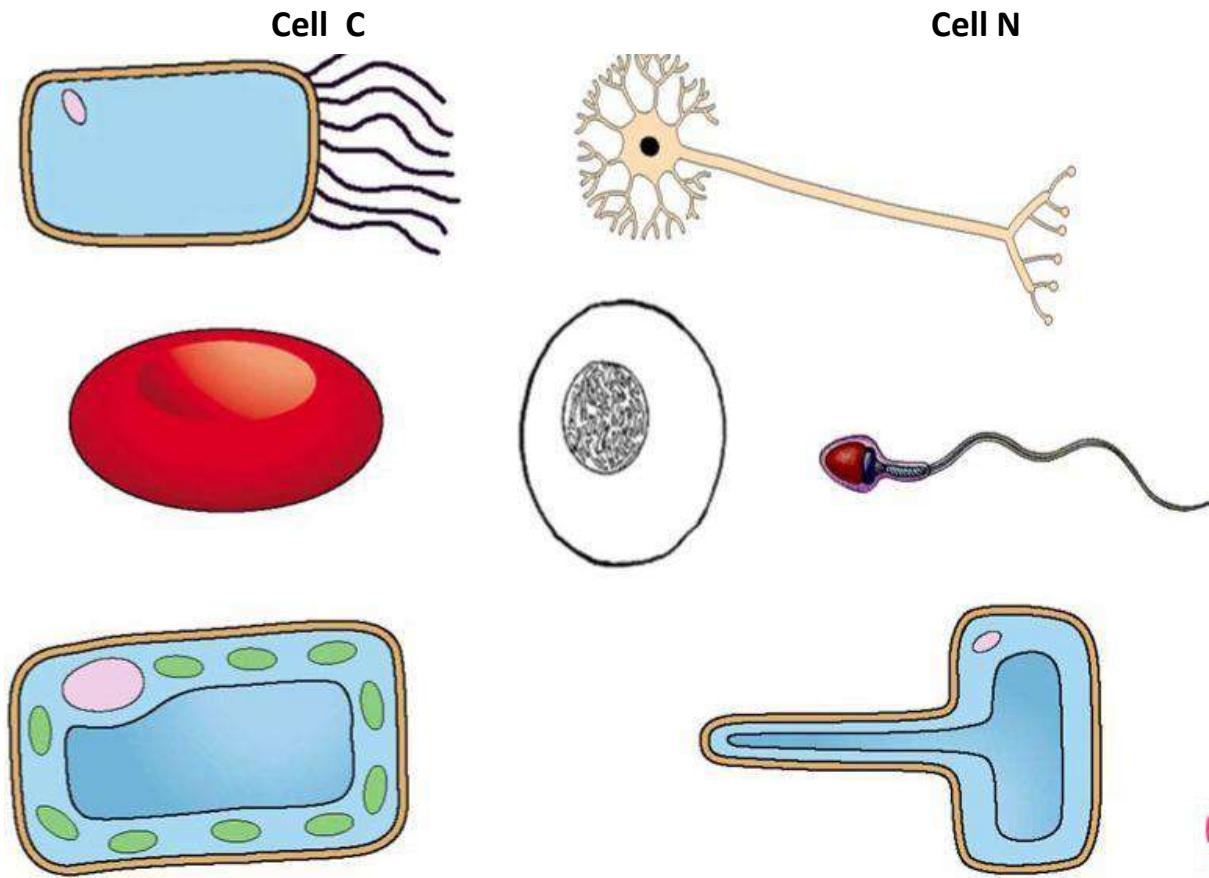
(e).Other than parts **Q** and **R** named in (c) above, state other two structural differences between cells **Q** and **R** ( 02 marks)

.....

.....

.....

2. Multicellular organisms are made of many kinds of special cells called **specialised cells**. Below are different structures of **specialised cells** found in some multicellular organisms. Use them and answer the questions that follow.



Cell E

(a). State what is meant by "**specialised cell**"

(01 mark)

.....  
.....

(b). Name the specialised cell labelled,

(04 marks)

- (i) C.....  
(ii) N.....  
(iii) E.....  
(iv) R.....

(c).From the diagrams above; state the ***adaptation*** of the specialised cells to their functions.

(i).**Cell C** (02 marks)

.....  
.....  
.....

(ii).**Cell E** ( 02 marks)

.....  
.....  
.....

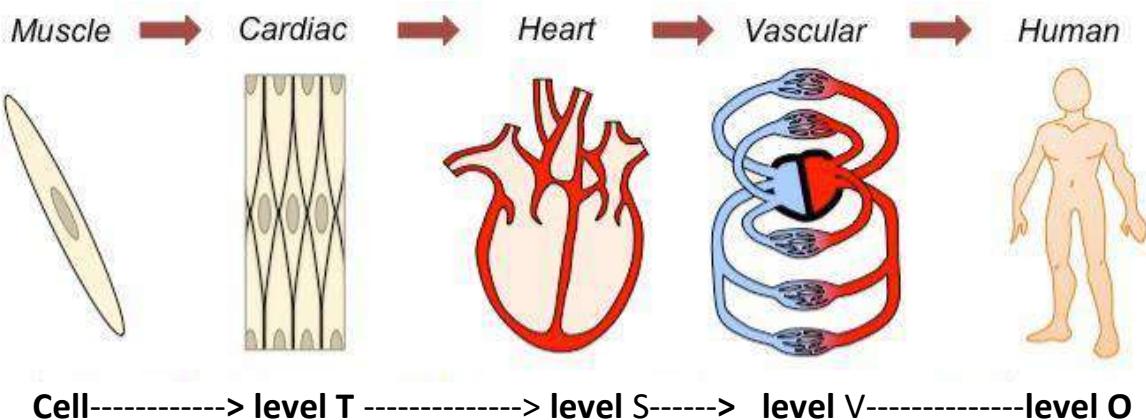
(d)State the function of **cell R** in man. (01 mark)

.....  
.....

(e)Three specialised cells above are not labelled with letters. Identify and **mark the specialised cell** with a letter which corresponds to its name as given below. ( 3 marks)

- Egg cell( Ovum) ----- Z
- Red blood cell..... W
- Sperm cell..... M

3.The life processes of the human body are maintained at several levels of structural organisation. Below are diagrams showing different levels of organisation in man. Use them and answer the questions that follow.



(a) Name the labelled levels of structural organisation in man, ( 04 marks)

(i) Level **T**.

.....

(ii) Level **S**.

.....

(iii) Level **V**.

.....

(iv) level **O**.

.....

(b) State the function of the following in the human body. (02 marks)

(i) Muscle cell.

.....

.....

(ii) heart.

.....

.....

(c) Of what importance is the **vascular** structure belonging to **level Y** in man.

(01 mark)

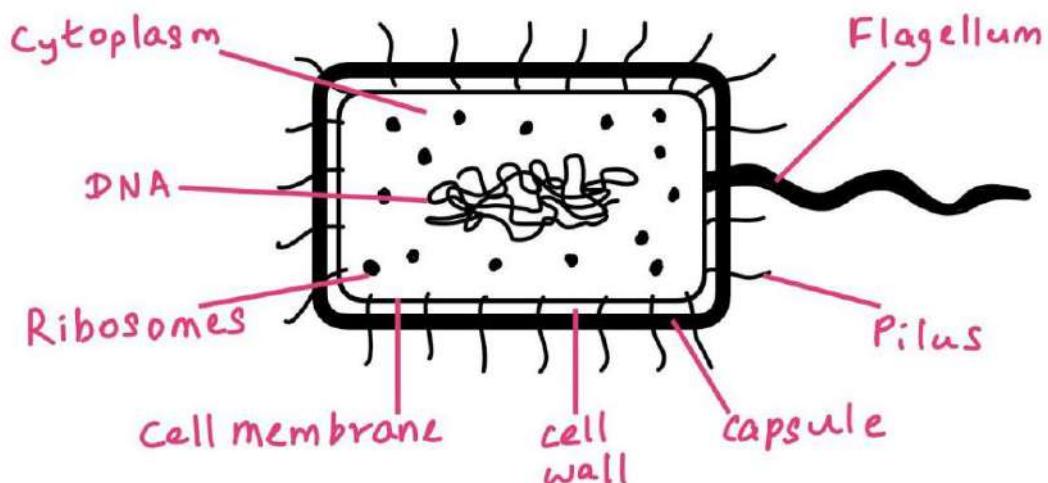
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## SECTION B.

*Attempt any 1 question. All questions carry equal marks.*

4.(a) Among the very many major challenges for health care systems is **infectious prevention and control. (I.P.C)** for infectious diseases. Infectious diseases are caused by harmful organisms (**pathogens**) that enter our bodies from the outside. The ministry of health organised a one day workshop in your school to sensitize you about infectious diseases. One of the posters pinned around the workshop had the structure of a **pathogen below**.



- (i) Name the pathogens whose structure is shown above. (01 mark)
- (ii) State the kingdom to which the pathogen named in (i) belongs. (01 mark)
- (iii) State three general features of the pathogens whose structure is shown above. (03 marks)
- (iv) Name three infectious diseases caused by the pathogens whose structure you shown above. (03 marks)
- (v) As a biology student who attended the infectious prevention and control(I.P.C) workshop about the pathogens whose structure is drawn above; suggest ways how each of the infectious diseases named in (iv) can be controlled in your community. (03 marks)

(b) Advancements in technological microbiology started to draw the attention of the market when products originating from microbial activity of above pathogens began to be required by man on a large scale.

State how bacteria are used in a number of ways basing on their natural metabolic capabilities. ( 04 marks)

5. One S.1 student; Arafat lost a key for his suit case one day after school visitation. His parents visited him and among packages was a loaf of tip top sweet bread. After a week; he broke the suit case only to find his bread appearing as in diagram below. Use the diagram to answer the questions that follow.



- (i) What name is given to the organism that developed on Arafat's bread. (01 mark)
- (ii) State the kingdom to which the organism named in (i) belongs. (01 mark)
- (iii) State **any two** general features of all organisms belonging to the kingdom stated in (ii) above. (02 marks)

- (iv) Draw a well labelled structure of the organism named in (i) above.  
(03 marks)
- (v) Name other two organisms that belong to the same kingdom as the organism named in (i)  
(02 marks)
- (vi) State other ways how some organisms belonging to the kingdom stated in (ii) are harmful to man.  
(02 mark)

(b) Covering the breadth of fundamental and applied research involving unicellular and multicellular fungi, “***fungal biology and biotechnology provides platform for industrial development which has greatly benefited man.***” As a S.1 student who has studied fungal biology; in four ways, justify the above statement  
(04 mark)

**END**

**@Ssemogerere Hasems-2022**

# LIGHT ACADEMY SECONDARY SCHOOL



S.1 BIOLOGY

**WORK 2**

Mr. Kaziba Naswiif

# Chapter 2: Cells Cont'n



A



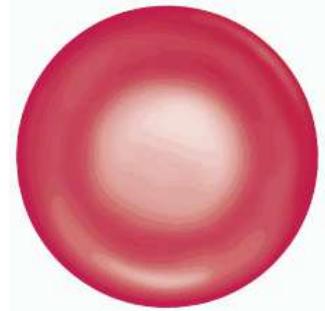
B



C



D

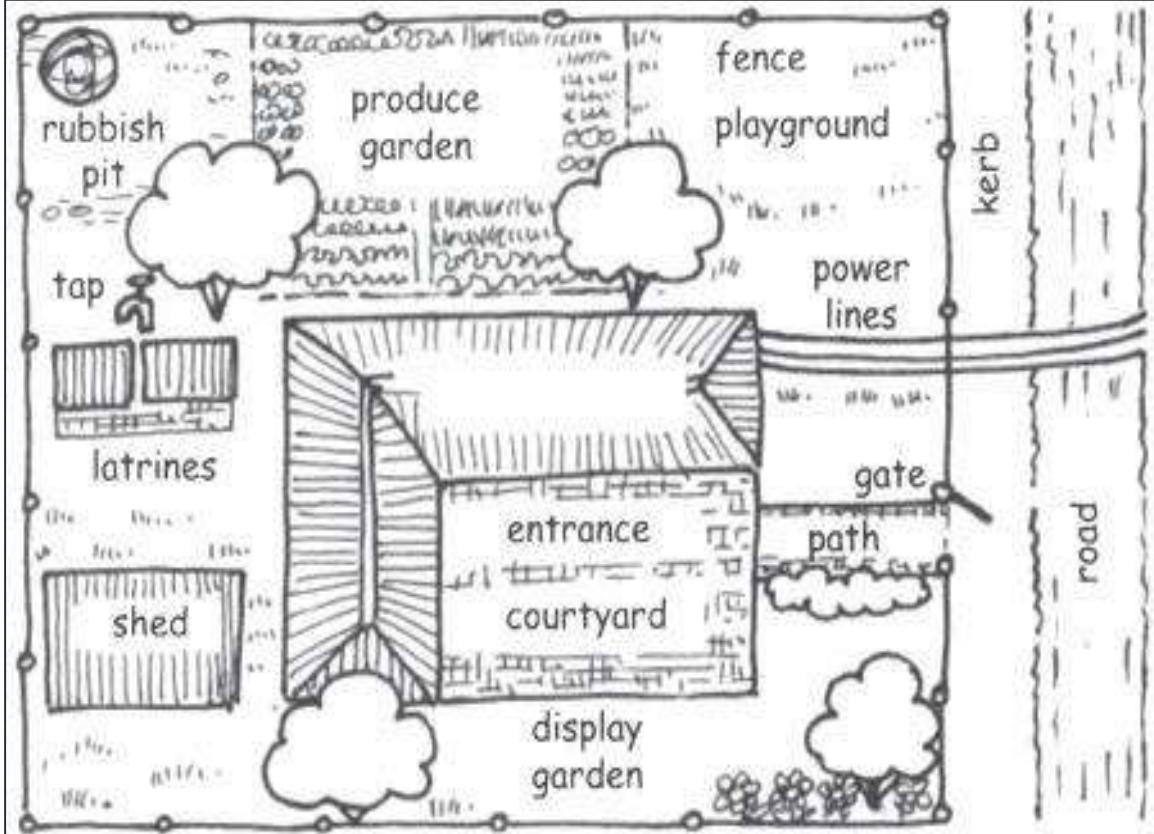


E

**Above, are specialized cells found in plants and animals.**

- Identify and name the cells found in animals and plants.
- How are the above cells adapted to their functions.
- Name other specialized cells not mentioned above.

# Group of cells: (Levels of organisation)



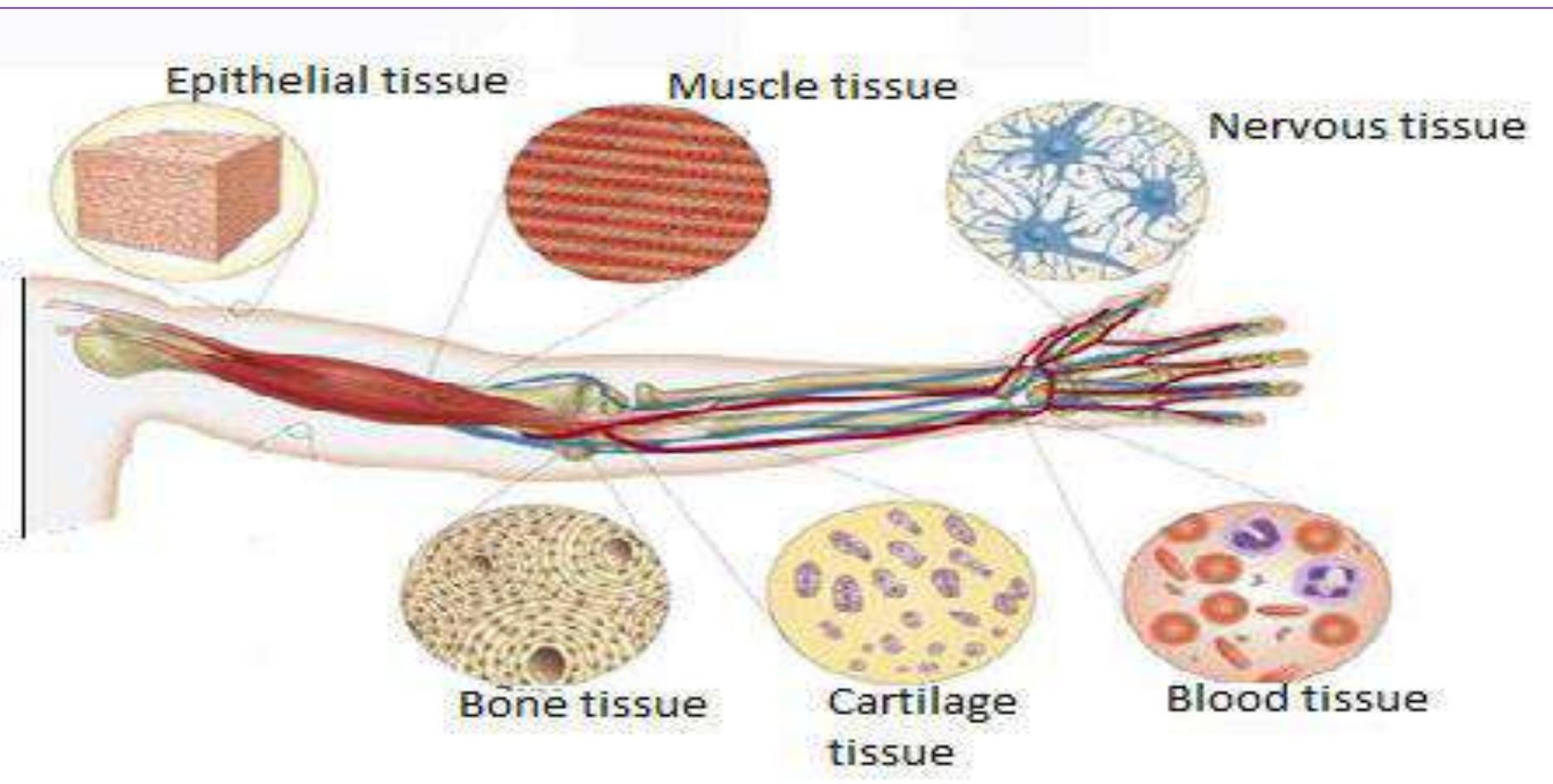
## Summary:

With examples, describe the different levels of organization in the your body.

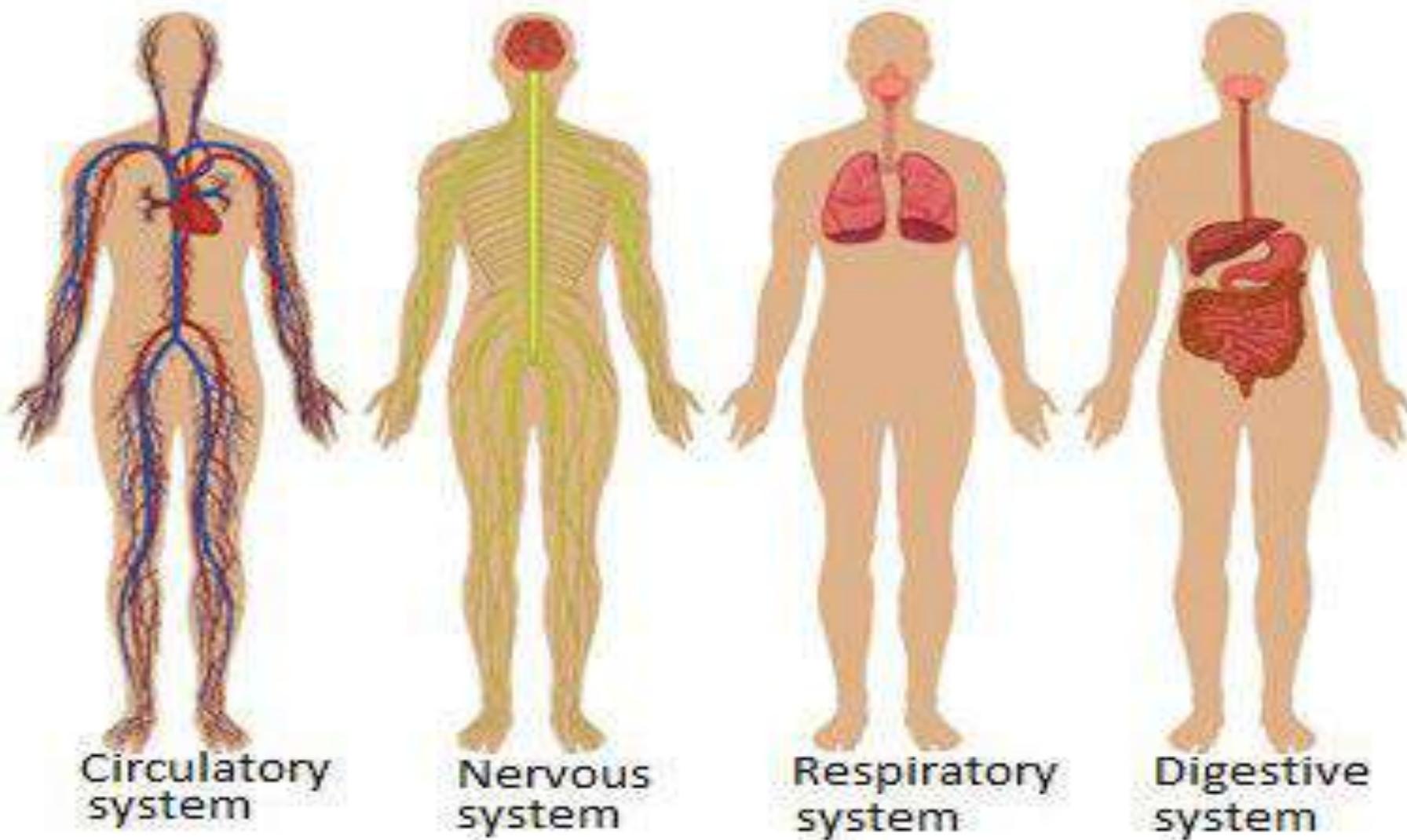
The above picture represents the school system, use it to answer the following.

- Name the places/parts of a school that you see in the picture.
  - The courtyard is made up of the following structures:
    - Room, Rooms, Walls, Bricks and Building.
- Relate these structures to how your body is arranged.
  - Arrange the above given answers (I) in an increasing order i.e. from the smallest unit to your whole body.  
Give examples in each case

- a) How is your arm useful to you as part of your body and how is it able to perform the functions mentioned above
- b) Draw and name the parts of an arm with its skin
- c) Identify the tissues in the arm and suggest the importance of those tissues found in those parts



**Identify the organs in the systems shown in the figure and state the function of each**



Following is a list of some functions of systems in your body. Match the functions to the corresponding system.

**Transports materials around the body**

Breaks down food substances  
For absorption

Exchanges gases between the body and the

Produces gametes

Filters waste from the body

Defends the body against disease

**Lymphatic system**

**Circulatory system**

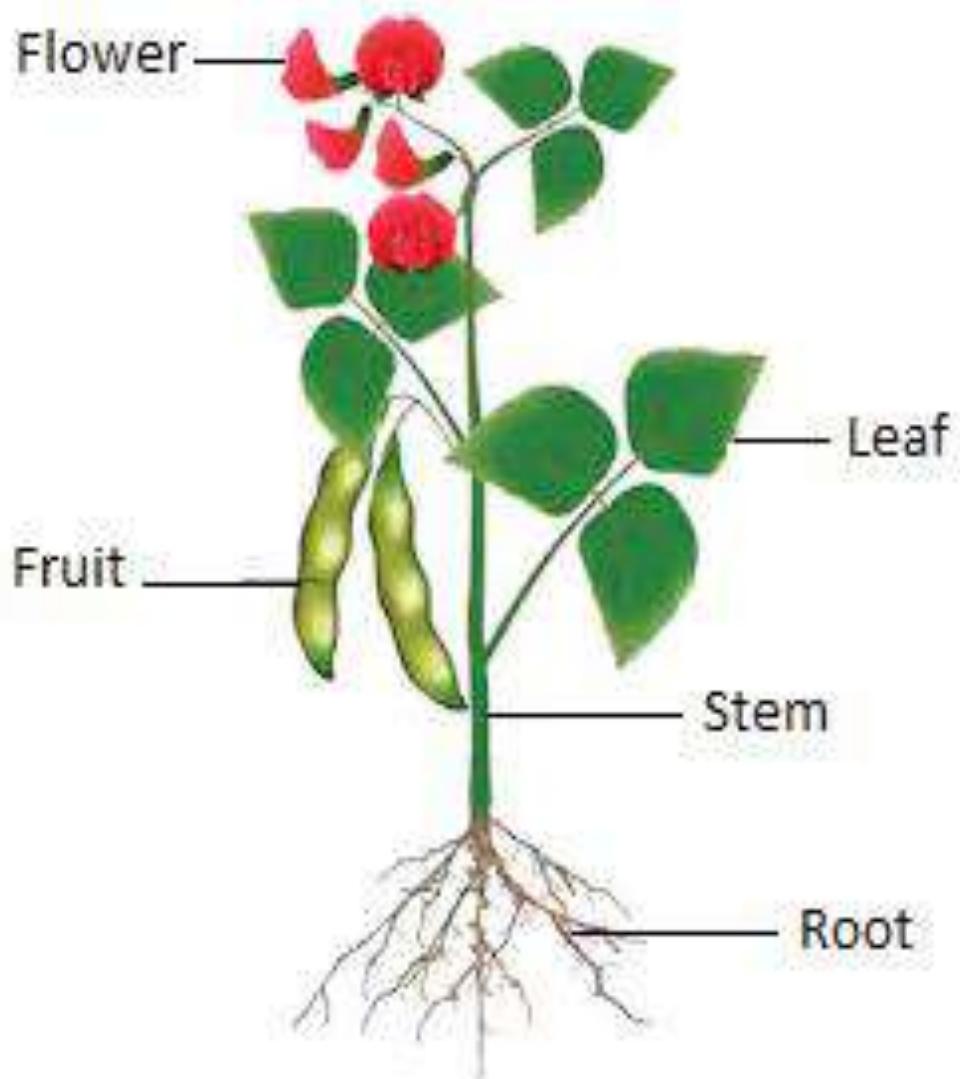
**Urinary system**

**Digestive system**

**Respiratory system**

**Reproductive system**

# Tissues, organs and systems in a plant



a) A plant is made up of the shoot and root system, mentions the organs making up the two systems of the plant.

- a) Give the functions of the following tissues below;
- Xylem
  - Phloem

Mention other tissues found in the plants

THE WORK IS TO BE DONE  
IS ONE WEEK'S PERIOD.

STAY HOME  
STAY SAFE  
WASH YOUR HANDS

## **S1- BIOLOGY ACTIVITY 2**

1. Draw and label the parts of the;
  - (i) Animal cell.
  - (ii) Plant cell.
2. Explain the functions of the following parts of the plant cell.
  - (i) Cell wall.
  - (ii) Cell membrane.
  - (iii) Nucleus.
  - (iv) Cytoplasm.
  - (v) Chloroplast.
  - (vi) Vacuole
3. State **four** differences and **four** similarities between a plant cell and an animal cell.
- 4a) With examples, describe the following terms;
  - (i) Zoology.
  - (ii) Botany.
  - (iii) Physiology.
- 4b) Explain any seven processes that enable all living organisms to survive.
5. Using a pen / a pencil and a notebook, name and draw pictures of various occupations or jobs you know of that requires the knowledge of biology or deals with the wellbeing of living things.

**END.**

NAME.....

LIN.....

553/1

BIOLOGY

PAPER 1

NOVEMBER.2023

2 HOURS



SHAPTA JOINT ASSESSMENT BOARD

Uganda Certificate of Lower Secondary Education

BIOLOGY

PAPER 1

SENIOR ONE

TIME: 2HRS

#### INSTRUCTIONS TO LEARNERS:

- Respond to **all** items in paper.
- Answers to all items must be written in the spaces provided.

1. a) Nalukenge 's father asked his daughter to get involved actively in biology lessons so that she does not forget the concepts easily, give five reasons why Nalukenge's father was encouraging her daughter to concentrate in biology

(10 scores)

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(b) Halima carefully cracked an egg and carefully poured out the contents in a clean Flat white plate, after thorough observation, he concluded that it was an animal cell, give five reasons why concluded that it was an animal cell (10 scores)

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2. a) How can you convince Namukisa Hawa who has just joined senior one at your school and has not yet learnt anything in biology that a human being is a living thing and has life? (10 scores)

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(b).Explain why you know and say that cassava is a plant and a cow is an animal

(10 scores)

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3. Viruses are common in our daily lives, they cause diseases like colds (flu) and more serious ones like Hepatitis B, Ebola in animals as it happened in Mubende and Kasanda last year and cassava mosaic in plants. According to doctors in the world, viral diseases can be treated recently our current minister of health emphasized students and Ugandans in 2020 on the way of preventing one of the pandemic.

a) i) Identify the pandemic our current minister of health was talking about

(01 scores)

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ii) What are the possible measures of preventing the above viral diseases?

(08 scores)

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iii) Who is the current minister of healthy in Uganda?

(01 score)

b) Aids is one of the killer disease (Viral disease) in Uganda, basing on the statistics in Uganda, six people per hour are getting infected with the above disease.

i) As a learner who has studied about viruses, what are the measures of preventing the above disease? (08 scores)

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ii) State the ways how an individual can be affected with Aids (02 scores)

4. Plants in our environment have green structures that they use for carrying out photosynthesis.

a) How would you explain to your sister in primary seven that plants are adapted for carrying out photosynthesis? (10 scores)

b) Explain how plants and animals depend on each other in nature. (07 scores)

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c) In your opinion, what do you think are the direct and indirect ways in which people benefit from plants? (03 scores)

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**END**

**S1 TEST FOR NEW CURRICULUM**

**ATTEMPT ALL**

**1 HOUR**

NAME ..... STREAM .....

1. In order to distinguish between living and non-living things, one has to look at life processes, as a S1 student with a good scientific background;
  - a) What is meant by the term life process?

.....  
.....

- b) Identify at least 5 life processes you know

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- c) From the pictures below, tell the life process and why?



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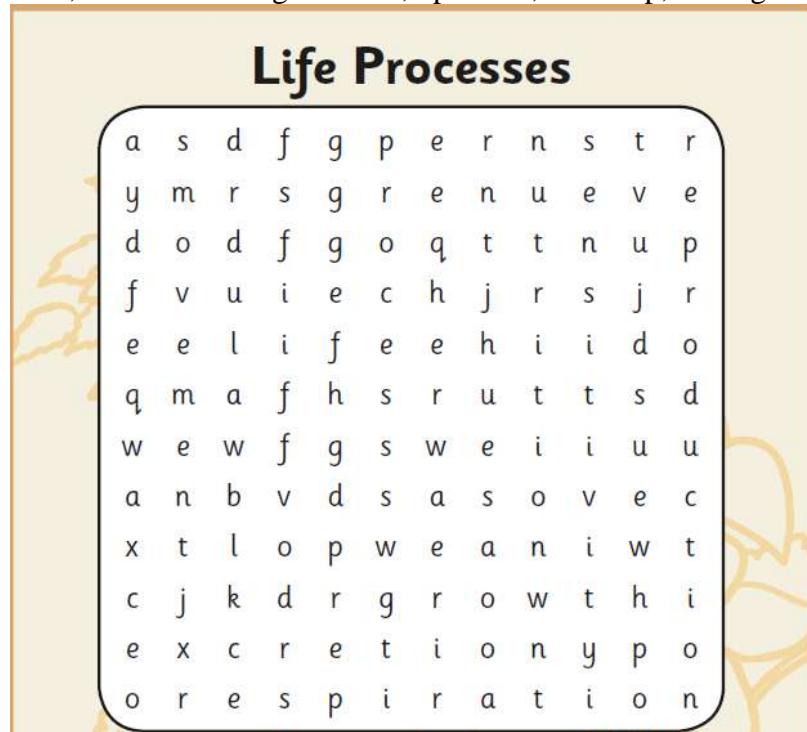


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2. Search for and circle seven words that refer to life processes. The words may appear straight across, backward straight across, up-down, down-up, or diagonally.



Identify at 4 structures that are usually present in

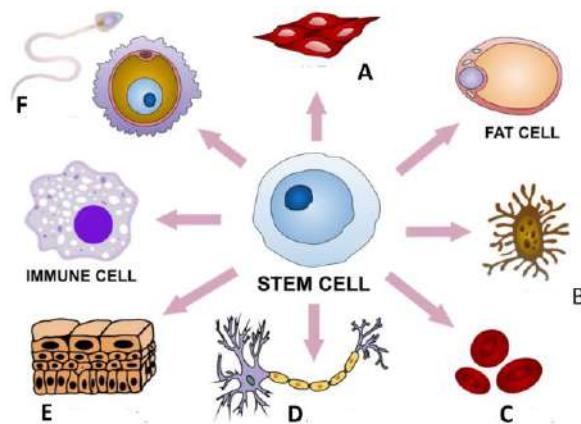
- a) Both animal and plant cells?

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.....  
.....

- b) Plant cells but not in animal cells?

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3. Below are some specialized cells, name the cells and state how they are adapted to perform their functions



CELL	NAME	ADAPTATION(S)
<b>A</b>		
<b>B</b>		
<b>C</b>		
<b>D</b>		
<b>E</b>		
<b>F</b>		

- b) What cell structure is largely responsible for controlling the entry and exit of substances into or out of the cell?

.....  
.....

- c) How does a cell membrane differ from a cell wall?

.....  
.....

- d) Below is the list of systems and their functions in the body. Match the systems to their corresponding functions

Lymphatic system	Filters waste from the blood
Digestive system	Produces gametes
Circulatory system	Exchanges gases between the body and the surrounding
Respiratory system	Transports materials around the body
Urinary system	Breaks down food substances for absorption
Reproductive system	Defends the body against disease

Name : ..... stream: .....

Signature:.....

553/1  
*Biology*  
*Paper 1*  
*(theory)*  
*August, 2023*  
*2 hours*

**BIOLOGY DEPARTMENT**  
*Uganda certificate of lower secondary education*  
*Senior one*  
**BIOLOGY**  
*Paper 1 (theory)*  
**2 HOURS**

**INSTRUCTIONS**

*This paper is made up of only one section, answer all the questions in this paper.*  
*Answers to these questions must be answered in the spaces provided.*  
*All working must be clearly shown and must be in black or blue ink.*  
*Any work done in pencil will not be marked except drawings.*

<i>For examiners' Use Only</i>						
<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>5</i>	<i>6</i>	<i>Total</i>

**1. AIDS is a viral disease that has claimed many lives of people worldwide. It is carried by a retrovirus which are small, very infectious and posses features for both living and nonliving things.**

**a) State three reasons why viruses are considered to be;**  
**i) Living things**

.....  
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.....

**ii) Nonliving things**

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.....

**b) Name the retrovirus that is responsible for causing AIDS.**

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.....

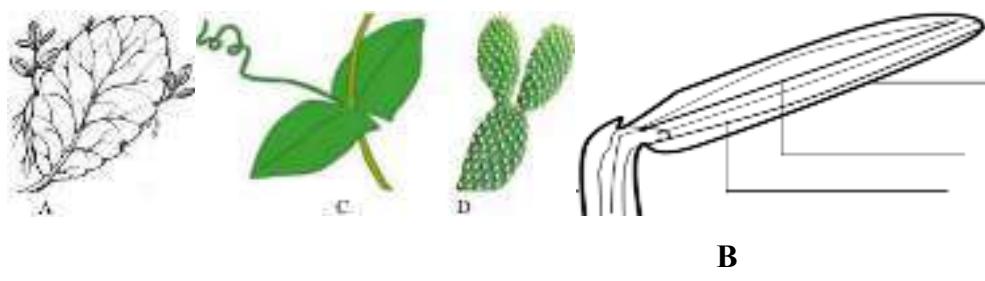
**c) Describe three ways how AIDS can be spread between S.1 members at SENK.**

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.....

**d) How can S.1 members at SENK prevent themselves from getting infected with AIDS.**

.....  
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2. The figure below shows similar plant organs which were obtained from different plants.



- a) Giving two reasons, identify the plant organs shown in the figure above.

Identify	Reasons

- b) State the class of the plant from which organ B was obtained, give two reasons for your answer.

Class	Reasons

- c) Using any observable features, construct a dichotomous key to identify the organs A, B, C and D.

3. During leisure time on Sunday, students at SENK watch programs on national geographic world channel. One day, they watched a lion chasing a giraffe and Moses, a senior one student was very much excited. The lion took only three minutes to capture the giraffe. As a biology student;

- a) With reasons, name any five life processes that were expressed in the above scenario.

Life process	Reason

4. When a bread is kept for a long period of time, some structures known as mould begin developing in the surfaces of the bread.



- a) Identify the kingdom to which they belong.

.....

.....

- b) State any three other organisms belonging to the same kingdom.

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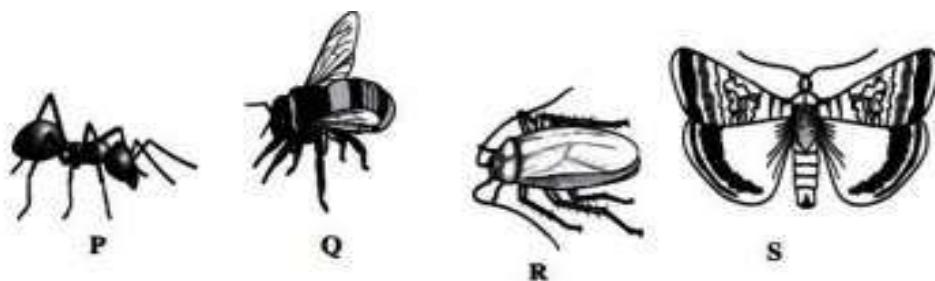
c) State any four characteristics of organisms in the kingdom.

.....  
.....  
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d) Giving examples in each case, suggest any four economic importance of organisms in the above kingdom.

.....  
.....  
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5. Arthropods are very vital living things in nature. Below are some pictures of common arthropods in our environment.



a) Giving reasons, identify the class of animal R.

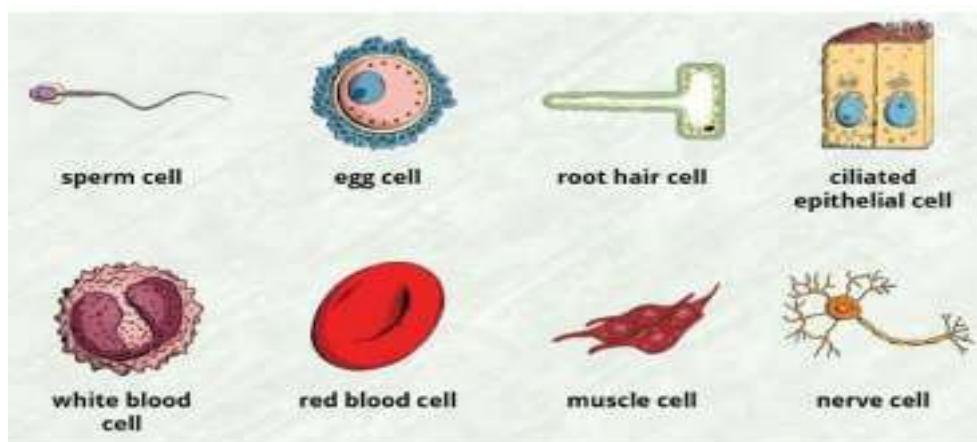
Class	Reasons

- b) State any two ways in which animal P is different from animal R.

Animal P	Animal R

- c) Using observable features on the drawings above construct a dichotomous key for the arthropods.

6. A block is made up of small units called bricks. In living organisms, these smallest units are called..... these units are grouped together to form tissues, which perform particular functions. The tissues are also grouped together to form .....which are also grouped together to form .....and finally an organism is formed.
- b) Some cells in living organisms are said to be specialized. A sample of them were researched by S.1 students of SENK and the figure is shown below.



- i) Explain the meaning of the underlined term and fill in the table below.

.....

.....

Cell name	Function

This is biology, not.....  
END

# **SENIOR ONE MID TERM TWO EXAMINATION**

## **ALL QUESTIONS ARE COMPULSORY**

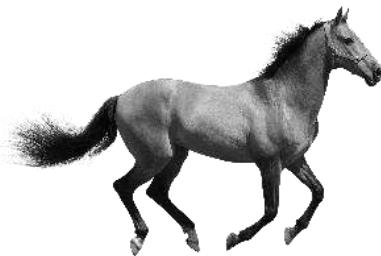
1. (a) From your competency about characteristics of living things, use the photographs below for you to say in writing what you know about each.



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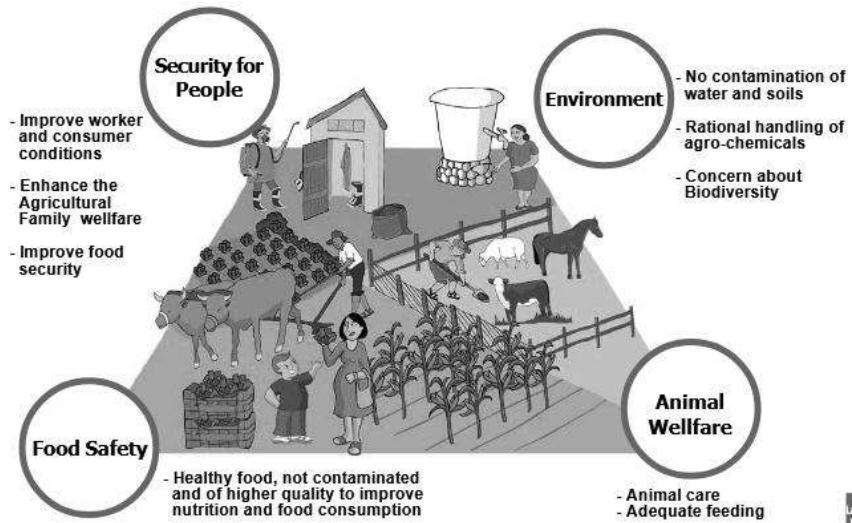
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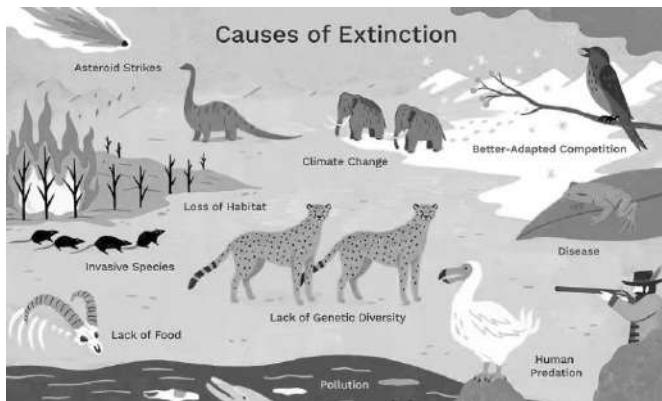
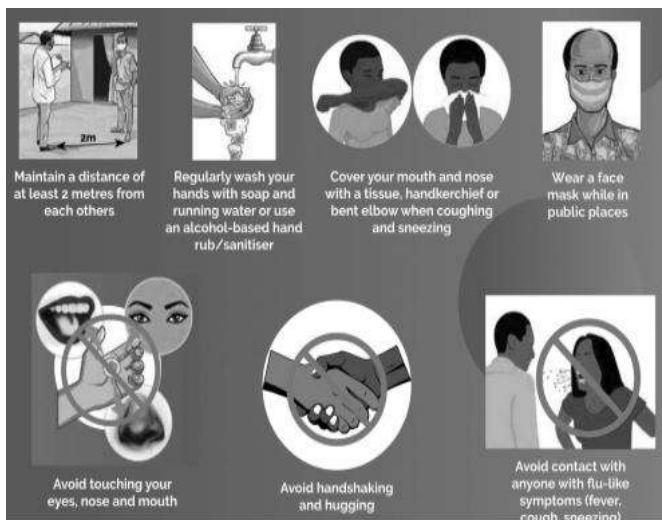
(b) Some things do not have life but show certain characteristics of living things. Use the photograph below to say what you know about the ways they show characteristics of living thing.



2. The following photographs interpret reasons for studying biology.







From the story below pick what you think agrees with the pictures above as the reasons for studying biology. Write your answers to the sides of the photograph

The knowledge of Biology helps us manage problems related to diseases, poor health, pollution, soil erosion, poaching etc. The study of Biology helps us to conserve animals and plants that are threatened with extinction (endangered species). Studying Biology enable us to get employment opportunities in Biology related jobs such as nursing, pharmacy, doctor, biology teacher, lab technicians etc. The study of Biology help us to practice good agricultural method to ensure steady production of food. The knowledge of Biology enables us to improve on our diet in order to avoid nutritional diseases such as goiter, pellagra, scurvy, night blindness etc.

3. Biodiversity means ..... of life forms. Or ..... of living things.  
 Nomenclature means giving ..... to organisms. However, in biology to be specific, organisms are given .....; hence organism nomenclature is referred to as binomial nomenclature.

The first rule applied in binomial ..... is that organisms are classified into a ..... hierarchy. This is because we use observable features known as taxon to classify organisms basing on their closeness in appearance to each other. Taxonomy is the branch of biology that deals with the .....

P530/1  
**BIOLOGY**  
Paper 1  
**NOVEMBER, 2023**  
2 Hours



**ST. JULIAN HIGH SCHOOL SEETA CAMPUS**  
*Uganda Lower Secondary Examinations*  
**END OF YEAR EXAMINATIONS 2023**

NAME:.....SIGN:.....

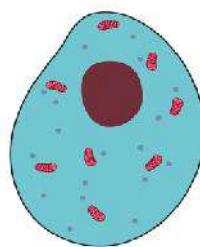
**Instructions**

- This paper consists of two sections A and B.
- Section A has 10 compulsory questions each carrying 4 marks and section B with 4 essay questions each carrying 10 marks.
- Attempt all questions in both sections.
- Answers to section A MUST be written in spaces provided while those to section B MUST be written on answer sheets provided.
- Poor handwriting will lead to loss of marks.
- Table below is for examiners' use only.

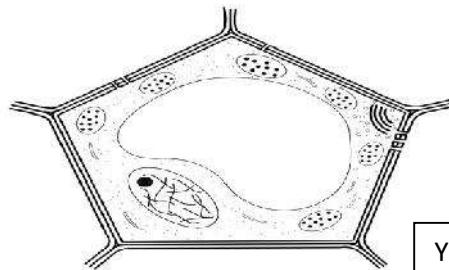
SECTION	SCORE
A	
B	
<b>TOTAL</b>	

## SECTION A

1. While in the laboratory, students of St. Julian high school Seeta campus used a light microscope and viewed the cells of organisms X and Y of which one was extracted from cheek of an animal and another from an onion epithelial.



X



Y

- (a) Which of them was extracted from the (2mks)
- (i) Animal.....
- (ii) Plant.....
- (b) State two differences between the two light microscope views X and Y. (3mks)

X	Y

2. In a group discussion at Mpoma HS, two students had an argument whether Viruses are living or non living things. They decided to visit the library and later found out that viruses are considered as living and non living things. Give two reasons that make them

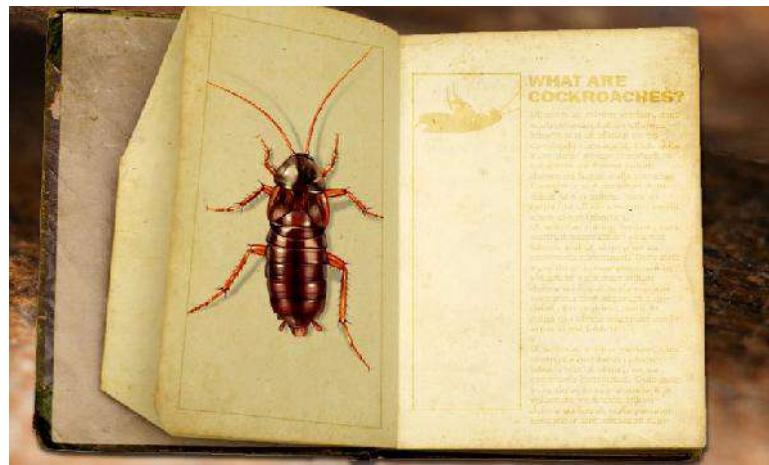
- (a) Living

.....

- (b) Non living

.....

3. During preparations to report to school for third term, Bernard checked his books in his suit case and found his books eaten and spoilt by organism M. He got concerned and decided to do research about this organism. The first information that was displayed on internet was the classification of the organism. Fill in the spaces provided to suit the information he got.



Kingdom:.....

Phylum:.....

Class:.....

Genus:.....

Species:.....

4. Bacteria are so common and have a lot of effects to the lives of living organisms and as well to non living things. Explain briefly 4 ways in which they are important in nature.

.....  
.....  
.....  
.....

5. Micro organisms are highly applied in daily life activities. One of their applications is in manufacture of foods that we eat daily. As a young nutritionist, choose any food product made by use of microbes. Describe briefly how the product is made.

.....  
.....  
.....  
.....  
.....

6. A biology teacher entered senior one class with the following plant organs for study purpose.



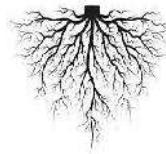
A



B



C



D

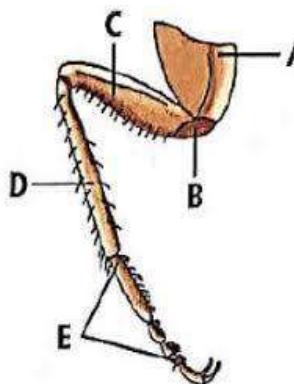
(a) Identify the plant organs that the teacher entered with in the class room.

.....  
.....  
.....  
.....

(b) In which way is each of the organs useful to the plant.

.....  
.....  
.....  
.....

7. In senior one a student wanted to research the detailed features of the hind limbs of the cockroach and a bee. He plucked off their hind limbs and took their images and kept them for future analysis



Cockroach



Bee

- (a) Describe any two features on the hind limb of a cockroach
- .....  
.....

- (c) Summarize the differences between the hind limbs above in the table below.

Hind limb of a cockroach	Hind limb of a bee

8. A patient from Igoba village was so ill then picked to the main hospital in Bugiri. Doctors on operation found his liver in ill conditions as shown below.



(a).Which viral disease attacked the body organ of that patient?

.....

(b).Write down two ways in which the disease can be transmitted by among humans

.....

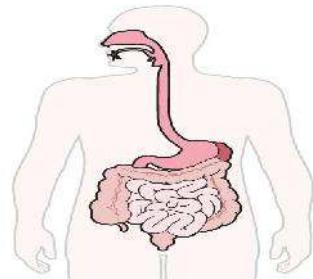
.....

Write down any two signs that you think the patient had.

.....

.....

9. Nakanjako's father had much desire for his daughter to know much about science. One day he bought her a chart on his way back from the super market. The chart had the body structure shown below



(a) Identify the body system that is on the above chart

.....

(b) In which way is the system helpful to the organism

.....

(c) Name any two organs that make up the above system, include their roles.

.....

.....

.....

10. Angiosperms are flowering plants. They are classified into

.....and .....

## **SECTION B**

11. Biology is such a vital subject. This made the Ministry of Education to make it compulsory to lower secondary level. Explain 7 benefits that students acquire as a result of studying it.  
**(10 MARKS)**
12. Ebola is such a deadly disease that has affected many regions of Uganda. Assuming part of your community is also having this threat. Design a poster having the preventive measures of this virus that can be used to educate people so as to fight against the disease.
13. Anita was tasked to gather different organism under class insecta. List any 4 organisms that anita would collect. Use them to construct a dichotomous key for their easy identification
14. In a discussion group learners were asked by their teacher to find out the similarities and differences between dicotyledonous plants and monocotyledonous plants. He provided them with the plants shown below.



Assuming you were part of the concerned group. Write down your findings to be presented to other group members and to the teacher before harmonization.

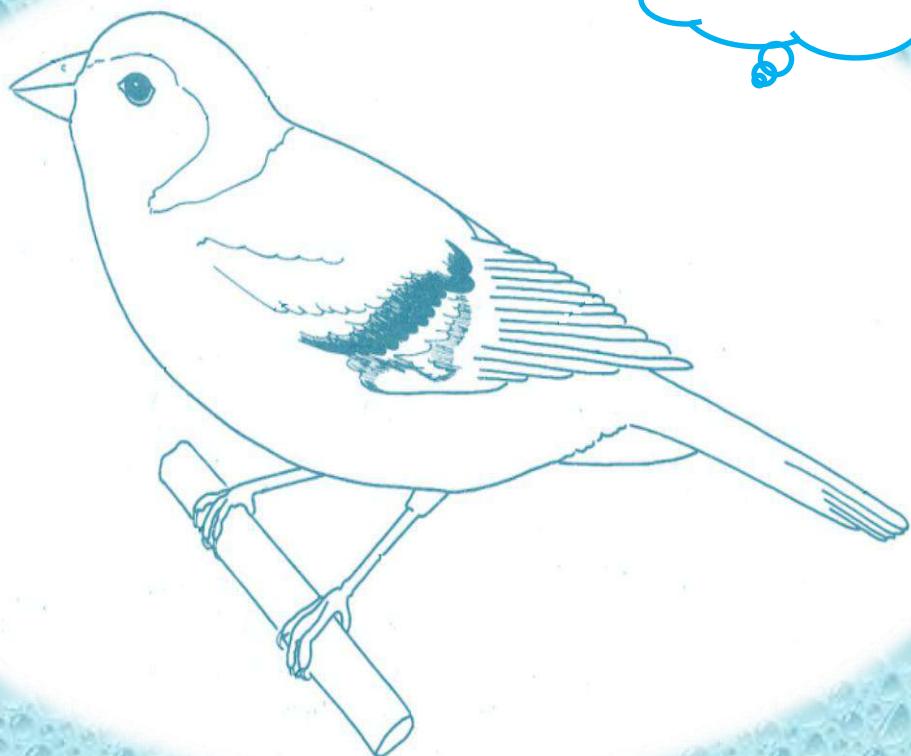
**(10 MARKS)**

**"YES WE CAN"**

# *Arthur's Diverse World of Living Organisms;* **SENIOR ONE BIOLOGY CLASS NOTES**

**2019**

**Online edition**



*A practical approach to theory teaching practices  
for the Uganda Certificate of Education with  
revision questions*

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# BIOLOGY

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ARTHUR'S DIVERSE WORLD OF LIVING ORGANISMS; JANUARY 2019

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Kugonza

## INTRODUCTION TO BIOLOGY

Biology is a word derived from **two Greek** words i.e. "***Bios***" and "***logos***" where ***Bios*** means **life** and ***logos*** means **knowledge**.

Therefore **Biology is the study of life or living things**. All living things are called organisms.

### Branches of biology

1. **Botany**, the study of plants.
2. **Zoology**, the study of animals.
3. **Anatomy**, the study of the structure of living things.
4. **Nutrition**, the study of food and how living things feed.
5. **Ecology**, the study of how organisms relate to their environment / surrounding.
6. **Mycology**, the study of fungi.
7. **Virology**, the study of virus.
8. **Bacteriology**, the study of bacteria.
9. **Entomology**, the study of insects.
10. **Microbiology**, the study of microorganisms.
11. **Physiology**, the study of process and functioning of the body parts.

12. **Genetics**, the study of inheritance.

13. **Taxonomy**, the study of classification of organisms
14. **Ornithology**, the study of birds.
15. **Ichthyology**, the study of fish.

### Why do we study biology?

- To get knowledge on how to treat the sick.
- To get knowledge needed to become doctors, and nurses.
- To get knowledge on how to manufacture drugs.
- To get knowledge on how to conserve the environment.
- To know how our body functions.
- To know more about living organisms in relation to their surroundings.

### Characteristics of living things

#### 1. Nutrition/feeding

It's a process by which living things obtain nutrients that support metabolic/biochemical processes in their bodies to support life. Green plants make their own food while the rest obtain already made food from the environment.

#### 2. Respiration

This is the breakdown of food to release energy in the body.

#### 3. Excretion

Is the process by which waste products are removed from the body e.g. urea in urine, carbon dioxide, etc.

#### 4. Reproduction

This is the ability of an organism to give rise to new organisms/off springs.

#### 5. Movement

This is the ability of an organism to transfer its body or part of its body from one place to another. They move in search for food, water, shelter, mates, and run away from predators. Locomotion is when an organism moves its whole body from one place to another. Plants do not locomote but can move their branches.

#### 6. Growth

Growth is a permanent increase in size of an organism. It is followed by development.

#### 7. Irritability / sensitivity

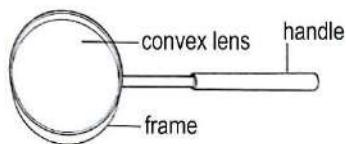
It is the ability of an organism to respond to changes like light, coldness, etc. in its environment.

### Revision questions

1. Define the term **biology**.
2. Explain what you understand by the following branches of biology:
  - i) **Zoology**
  - ii) **Botany**
  - iii) **Ecology**
  - iv) **Parasitology**
3. List the characteristics of living organisms.
4. State three reasons why biology should be learnt.

## SPECIAL TOOLS USED IN THE STUDY OF BIOLOGY

### 1. Hand lens:



It is used to magnify the whole object or tiny features on the surface of biological objects (specimens). For example; hairs on the legs of house flies, segments of the antennae of a cockroach, spines on the legs of a cockroach, etc.

When using this tool, the object appears bigger through the convex lens than its real size. The object is said to be magnified. **Magnification** refers to how much bigger the object

appears compared to its real size. When the object is drawn, we use a formula to calculate how much bigger the drawing appears from the real object.

$$\text{Magnification} = \frac{\text{size of the image/drawing}}{\text{size of the object}}$$

**Example:** Calculate the magnification of an object, which is 10cm tall whose image appears to be 20cm tall.

**Solution**

$$\text{Magnification} = \frac{\text{size of the image/drawing}}{\text{size of the object}} = \frac{20 \text{ cm}}{10 \text{ cm}} = \times 2$$

### Biological drawings

The following suggestions are important when making a biological drawing:

1. A well sharpened lead pencil should be used for drawing.
2. The drawing should occupy a half or three quarters of the space provided.
3. Each drawing should have a title preferably placed at the top.
4. Enough space should be left all around the drawing for labelling.
5. The outline should be simple and clear.
6. Double lines should only be used when showing a cut surface.
7. Label lines should touch the structures.
8. Label lines should not have arrow heads. Arrow heads indicate direction of movement.
9. The magnification of the drawing should always be worked out.
10. The drawing should not be shaded whether by pencil or crayons.

### Assignment:

Following the rules above, draw and label a black jack leaf (or any other simple small leaf from any plant in the school compound).

### 2. Microscope:

It is an instrument used to view objects that are too small to be seen by an unaided eye.

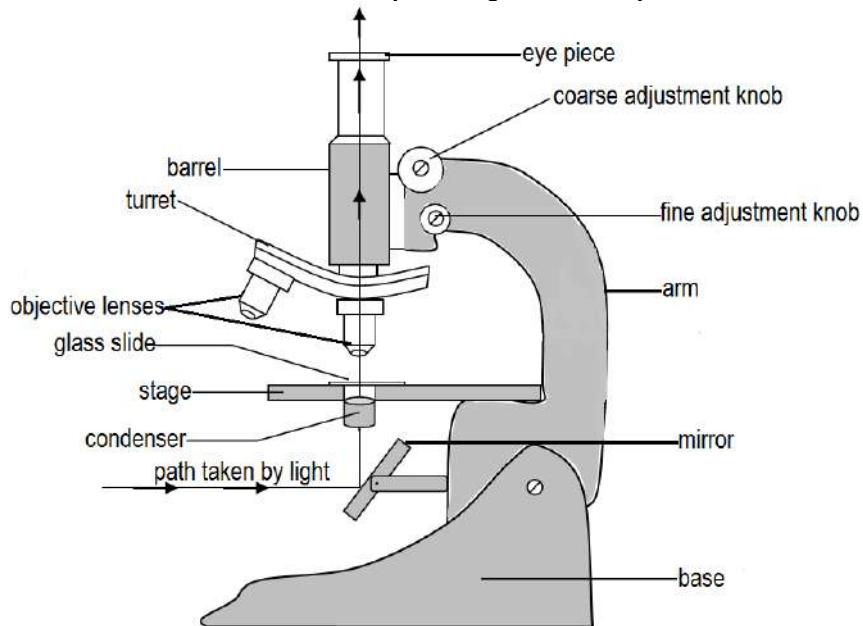
#### Types of microscopes

- The electron microscope which uses a beam of electrons.
- The compound light microscope.

#### The compound light microscope

It is called so because it uses a beam of light to view objects and has more than one convex lens. It is used in hospitals, schools and some industries.

### Structure of a compound light microscope



### Functions of the different parts

#### **1. Eye Piece:**

It is where the eye is placed while viewing the specimen.  
Enables one to view the specimen.  
It magnifies the image from the objective lens.

#### **1. 2. Barrel:**

Provides support for the eye piece and objective lens.

#### **2. 3. Nose piece/turret:**

It holds the objective lenses in position.

Can be rotated to position a particular lens required for a particular magnification.

#### **3. Stage:**

It is where a prepared slide is placed for observation.

#### **4. 5. Mirror:**

It reflects light from external source through the specimen.

#### **5. 6. Stand/Base:**

Supports instrument in on a flat surface.

#### **6. 7. Clip:**

Keeps the slide firmly on the stage.

#### **7. 8. Diaphragm:**

Regulates the amount of light passing through the specimen

#### **9. 10. Condenser:**

Concentrates the light reflected by the mirror through the object / specimen on the stage.

#### **10. 11. Arm:**

Used for carrying the instrument.

#### **11. 12. Coarse adjustment knob:**

Used for focusing of the object under study.

#### **12. 13. Fine adjustment knob:**

Brings specimen into a sharp clearer focus (final focusing).

#### **13. 14. Objective lens:**

Magnifies the specimen under study. They are normally two or three. Low power (shortest), medium power and high power (longest).

### Care of a microscope

The microscope is very delicate, expensive instrument which is very useful in the study of biology. Thus it should be handled carefully doing the following;

- It should be carried with both hands.
- Should never be dropped.
- Always kept in an upright position
- Only wipe the lens with soft lens tissue.
- It should always be kept in its special designed box.

### Determination of magnification of a microscope

Magnification refers to how much larger the object appears compared to its real size.

Magnification = magnification of the eye piece lens X magnification of the objective lens.

#### **Example:**

If the eye piece is marked **x10** and the magnification of the objective lens is **x40**, what is the total magnification of a microscope?

*Magnification = magnification of the eye piece lens x magnification of the objective lens.*

$$=10 \times 40 = 400$$

The specimen was magnified X400

### Revision questions

1. What is a hand lens used for?
  2. A leaf drawn using a hand lens measured 10 cm long. The actual length of the leaf was 5 cm. work out the magnification of the drawing.
  3. Complete the table below
- | Eye piece lens | Objective lens | Magnification |
|----------------|----------------|---------------|
| X15            | X7             | .....         |
| X60            | .....          | X240          |
| .....          | X17            | X340          |
| X25            | X8             | .....         |
4. If the magnification power of the eye piece lens is x10 and the total magnification of a specimen observed using the microscope is x300, work out the magnification power of the objective lens.

### LEVELS OF ORGANISATION IN ORGANISMS

This is the building plan of an organism's body from the simplest to a more complex structure called an organism. The starting or smallest unit of life is the cell. The organisationnis as follows:

**Cell → tissue → organ → organ system→organism**

The living organism is a system of interwoven and overlapping hierarchies of organization. Each level makes the base for the next higher level. The properties of that level are unique and are different from any level.

Each level of organization is more complex and has fewer units than the previous one, i.e. there are lesser tissues than cells. Cell is the lowest level that is considered to be alive. The structural hierarchy represents how matter has become more and more organized with each level.

Level of organization	Definition	Examples and functions
1. Cell	Smallest basic unit of life	Red blood cell, root hair cell, cheek cells.
2. Tissue	A tissue is a group of similar cells linked together to perform a particular function. A tissue may be made up of single type of cell or may comprise of different types of cells.	i) Blood tissue made up of red blood cells, white blood cells and platelets. Blood transports materials in the body and offers protection. ii) Nervous tissue made up of nerve cells. It transmits impulses in the body. iii) Muscular tissue made up of muscle cells which cause movement of body parts iv) Photosynthetic tissue made of palisade cells for photosynthesis.
3. Organ	An organ is a collection of tissues specialized in carrying out a specific function. An organ is made up of different types of cells grouped together as a unit	i) Eye for sight ii) Heart for pumping blood iii) Ear for hearing iv) Kidney for purifying blood v) Leaves for photosynthesis vi) Roots for absorbing water and mineral salts
4. Organ system	An organ system is a collection of different organs performing a specific function(s)	i) Nervous system (Brain, Spinal cord and nerves), ii) Circulatory system (Heart, Lungs and Blood vessels), iii) Digestive system (gullet, stomach, small intestines). iv) Shoot system (leaves stems. flowers) v) Root system (roots)
5. Organism	This is a collection of organ systems working together efficiently as a unit.	man, cow, banana plant

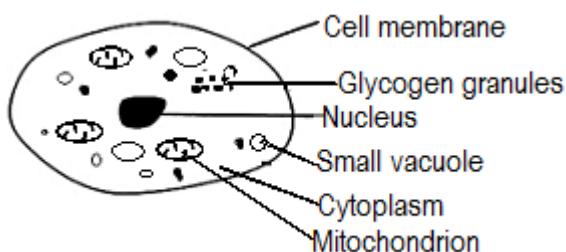
## THE CELL

The cell is the smallest basic unit of life. Unicellular organisms are only made up of a single cell e.g. amoeba, paramecium. Multicellular organisms are made up of many cells e.g. man, cows, bean plant, etc.

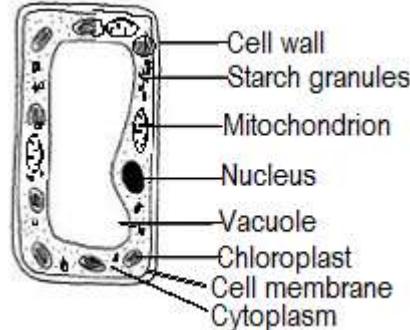
### The origin of new cells

New cells are formed from already existing cells by a process called cell division. The already existing cell is called a parent/mother cell; and the new cells formed are called daughter cells.

**Animal cell**



**Plant cell**



**Cell parts and their functions**

Cell part	Description	Function
1. <b>Cell Membrane</b>	Thin layer surrounding the protoplasm of cells. In animal cells it's the outer most and in plant cells it's beneath the outer layer called cell wall.	<ul style="list-style-type: none"> <li>It allows movement of materials in and out of the cell.</li> <li>Offers protection to the inner parts of the cell.</li> <li>Binds protoplasm/cytoplasm hence regulating the shape and strength of a cell.</li> </ul>
2. <b>Cell Walls</b>	Outer most layer in plant cells. It is made up of a material called cellulose which gives the cell its rigid tough nature.	<ul style="list-style-type: none"> <li>It offers mechanical strength to the cell.</li> <li>It gives the plant cell its shape.</li> <li>Protects the inner parts of the cell.</li> <li>Allows movement of materials in and out of a cell.</li> </ul>
3. <b>Nucleus</b>	It is surrounded by double membrane called the nuclear membrane. The contents of the nucleus are called <b>nucleoplasm</b> .	<ul style="list-style-type: none"> <li>Controls cell activities.</li> <li>Controls cell division.</li> <li>Stores the genetic material of a cell.</li> </ul>
4. <b>Cell Vacuole</b>	Contains a watery substance called cell sap and is surrounded by a single membrane called the <b>tonoplast</b> . Each Plant cell possesses one large permanent large central vacuole while each animal cell has many small temporary vacuoles.	<ul style="list-style-type: none"> <li>Stores waste materials before they are expelled.</li> <li>It is a temporary food store.</li> <li>Gives shape to the cell.</li> </ul>
5. <b>Cytoplasm</b>	It is a fluid material that contains cell organelles e.g. mitochondria, nucleus etc.	<ul style="list-style-type: none"> <li>Site for cell activities i.e. metabolic reactions.</li> <li>Site for storage of energy producing materials e.g. starch and glycogen.</li> </ul>
6. <b>Mitochondria</b>	This is the cell 'power house'. It is found in both plant and animal cells.	<ul style="list-style-type: none"> <li>It manufactures and releases energy through respiration.</li> </ul>
7. <b>Chloroplast</b>	Found only in plant cells.	<ul style="list-style-type: none"> <li>Contains a green pigment called chlorophyll that traps sunlight for photosynthesis.</li> </ul>

**Comparing a plant and animal cell****Similarities**

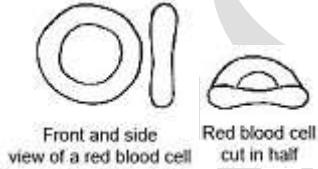
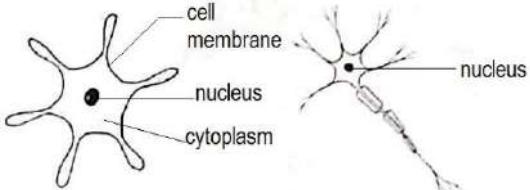
- Both have a nucleus.
- Both have mitochondria.
- Both have a vacuole.
- Both have a cytoplasm.
- Both have a cell membrane.

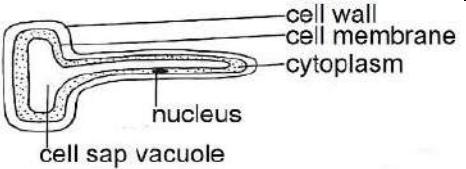
**Differences:**

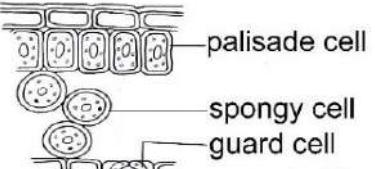
<b>Plant cell</b>	<b>Animal cell</b>
i) Regular in shape	Irregular in shape
ii) Has a cellulose cell wall.	Lacks a cellulose cell wall.
iii) Has chloroplast.	Lacks chloroplast.
iv) Large vacuole centrally located.	Cell vacuole very small and positioned at the side.
v) Has a middle lamella.	Lacks a middle lamella.
vi) Nucleus is positioned at one side.	Nucleus centrally located.
vii) Store food as starch granules.	Store food as glycogen granules.
viii) Has a tonoplast around the vacuole	Has no tonoplast
ix) Has a thin layer of cytoplasm	Has a thick layer of cytoplasm
x) Has a permanent vacuole	Has a temporary vacuole

**SPECIALISED CELLS**

These are individual cells modified to perform a particular function.

<b>Specialized animal cell</b>	<b>Drawing</b>	<b>Function</b>
Red blood cells		These transport oxygen in our bodies.
Sperm cells		These fuse with the ovum to form a zygote during fertilization
Ovum or egg cell		This is the female reproductive cell that fuses with a sperm to form a zygote.
White blood cells		This defends the body against infections and diseases
Nerve cells		They transmit impulses.

<b>Specialized plant cell</b>	<b>Structure</b>	<b>Function</b>
Root hair cells		They are found in plant roots They absorb water and mineral salts from the soil

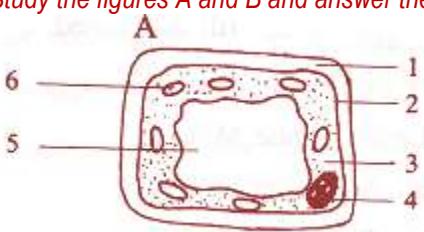
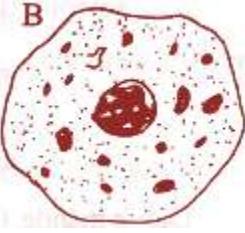
Palisade cells		These are found in leaves of green plants. They carry out the process of photosynthesis
Guard cells		They control the opening and closing of stomata in leaves
Parenchyma cells		Support in herbaceous plants Storage of starch.

### Differences between plants and animals

Plants	Animals
Their cells have cell wall.	Their cells lack cell wall.
Have chlorophyll.	Lack chlorophyll.
They are generally stationary. However, they move parts of their body such as opening and closing of petals.	Animals move from one place to another.
They make their own food by photosynthesis.	Feed on already made food.
Respond to stimulus slowly.	Respond to stimulus very fast.

### Revision questions

1. Which of the following is **not true** about the cell wall? It is
  - A. Freely permeable
  - B. Non-living
  - C. Selectively permeable
  - D. Found in plants
2. Genetic material in a cell is located in the
  - A. Cytoplasm
  - B. Chromosome
  - C. Nucleus
  - D. Membrane
3. Study the figures A and B and answer the questions that follow:
 

  - a) What does A and B represent? (2 marks)
  - b) Name the parts labelled 1 – 6 (3 marks)
  - c) State two functions of part labelled 5. (2 marks)
  - d) Part 6 contain a green pigment called: ..... (1 mark)
  - e) The part which controls the activities of the whole cell is part ..... (1 mark)
  - f) Part 5 contains a liquid made up of water and dissolved solutes. The liquid is called.....(1 mark)
  - g) A has 3 parts which are absent from B, Name the 3 parts. (3 marks)
4. Differentiate between a cell and an organelle.
5. Define the following terms giving two examples in each case:
  - a) Tissue.
  - b) Organ.
  - c) Organ system.
6. Name the organelles that would be found in large numbers in the cells of a rapidly respiring tissue. Give a reason to support your answer.
7. Name two structures which are present in plant cells but absent in animal cells

## TOPIC 1: DIVERSITY OF LIVING ORGANISMS

### CLASSIFICATION OF LIVING THINGS

Classification is the process of placing animals and plants into groups according to their similarities in structure, physiological processes and behavioral.

This involves collecting organisms, observing their structural characteristics and sorting them into groups known as **taxa**.

The branch of biology concerned with classification is called **taxonomy**.

The word taxonomy is derived from a Greek word *taxis*- meaning arrangement and *nomia*-meaning distribution.

#### Levels of classification

The level of classification is called taxon. *Plural* –taxa. A taxon is a unit of classification made of similar organisms. The largest taxon is the kingdom and the smallest taxon is the species. All organisms have been put in seven major taxa and these include:

- |                                   |                                   |
|-----------------------------------|-----------------------------------|
| 1. Kingdom                        | 5. Family                         |
| 2. Phylum ( <i>plural</i> -phyla) | 6. Genus ( <i>plural</i> -genera) |
| 3. Class                          | 7. species                        |
| 4. Order                          |                                   |

#### Easy formula for seven taxa from highest to lowest

Kids <b>K</b> (Kingdom)	Play <b>P</b> (Phylum)	Cards <b>C</b> (Class)	On <b>O</b> (Order)	Fairly <b>F</b> (Family)	Good <b>G</b> (Genus)	Sides <b>S</b> (Species)
-------------------------------	------------------------------	------------------------------	---------------------------	--------------------------------	-----------------------------	--------------------------------

#### **Kingdom:**

A kingdom is the largest taxon, and all the other taxa (groups of living organisms) are placed in one of the kingdoms. In modern classification system, there are 5 kingdoms:

- |                      |             |
|----------------------|-------------|
| 1. Monera (bacteria) | 4. Plantae  |
| 2. Protocista        | 5. Animalia |
| 3. Fungi (Mycota)    |             |

#### **Note:**

Viruses are not classified in any of the five kingdoms because they do not have all the characteristics of all living things. For example;

- ✓ They do not have cellular structures like cytoplasm and organelles.
- ✓ They use nuclear material and organelles of other living organisms to carry out their metabolic processes.
- ✓ They can survive out of their host's cell as inert organic crystals.

#### **Species:**

A species is the smallest taxon which is made up of individuals that have almost the same characteristic features and can interbreed freely to produce viable off springs i.e. reproductively fertile off springs

#### Examples of hierarchy system of classification

	<b>Human</b>	<b>Honeybee</b>	<b>Maize</b>	<b>Meadow mushroom</b>
<b>Kingdom</b>	Animalia	Animalia	Plantae	Fungi
<b>Phylum</b>	Chordata	Arthropoda	Angiospermophyta	Basidiomycota
<b>Class</b>	Mammalia	Insect	Monocotyledoneae	Basidiomycetes
<b>Order</b>	primates	Hymenoptera	Commelinales	Agaricales
<b>Family</b>	Hominidae	Apidae	Poaceae	Agaricaceae
<b>Genus</b>	<i>Homo</i>	<i>Apis</i>	<i>Zea</i>	<i>Agaricus</i>
<b>Species</b>	<i>sapiens</i>	<i>mellifera</i>	<i>mays</i>	<i>campestris</i>

#### Binomial system of nomenclature

Binomial nomenclature is the system of giving a scientific name to an organism.

The word binomial comes from two words *bi-* meaning two and *nomio*-meaning name.

The first accepted classification and nomenclature was introduced by a Swedish scientist, **Carl Linnaeus (1707-1778)**.

### Rules of binomial system of nomenclature

1. Each organism should be given two Latin or Greek names which include generic (genus) name followed by specific (species) name.
2. The generic name should start with a capital letter and a specific name starts with the small letter.
3. When written both names should be **underlined separately** or **printed in italics**.

### Examples of some scientific name for common organisms.

Human – scientific name is *Homo sapiens* (*Homo sapiens* – when hand written)

Maize – scientific name is *Zea mays*

### Importance of classification

- ✓ It is easy to study organism in a group since the members of a specific group resemble.
- ✓ It helps new organisms to be easily classified since they share certain characteristics with those in existence.
- ✓ It helps the scientist to easily identify organisms belonging to the same group.
- ✓ The use of scientific names enables to prevent confusion that would arise if the organism had different names used in different places.

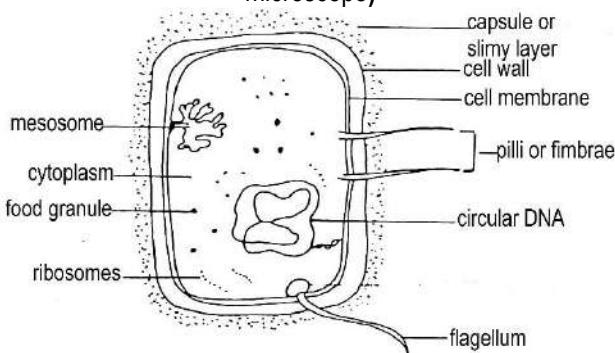
### Exercise

1. *What is a species?*
2. *Explain the following terms:*
  - a) Classification
  - b) Taxonomy
  - c) Binomial nomenclature
3. *Explain the relationship between genus and species.*
4. *Name the major taxonomic units used in classifying living organisms.*
5. *Why is it important for organism to be given scientific names?*
6. *Write the scientific names of the following; honey bee, meadow mushroom and house fly.*
7. *Blackjack (*Bidens pilosa*) belongs to the family compositae. What is its*
  - a) Genus?
  - b) Species?
8. *Who is Carl Linnaeus (1707-1778)?*

## KINGDOM MONERA

This basically comprises of bacteria which are prokaryotes. They lack membrane bound organelles.

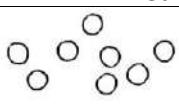
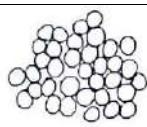
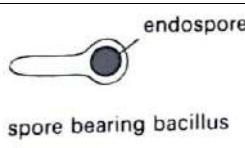
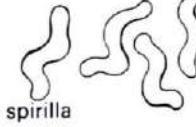
### General structure of bacterium (under electron microscope)



### General characteristics

- ✓ They are microscopic, unicellular and small organisms with cells occurring either alone or in colonies.
- ✓ They have autotrophic, saprophytic and parasitic mode of life.
- ✓ They reproduce asexually by means of spores or binary fission.

Bacteria are grouped according to their shapes. There are four groups of bacteria

Shape	Type	Structure
Spherical	<b>Cocci:</b> These are spherical bacteria. <b>Diplococci:</b> These occur as a pair of spherical bacteria.	
	<b>Staphylococcus:</b> Spherical shaped occurring in a bunch or group.	
	<b>Streptococcus:</b> Spherical bacteria in a chain.	
Rod shaped	<b>Bacilli:</b> Single rod shaped bacterium.	
	<b>Spherical spore bacilli:</b> These have spherical spore at the head e.g. <i>Clostridium tetani</i> which causes tetanus.	
Curved	<b>Spirilla:</b> These are spiral shaped bacteria.	

### Economic importance of bacteria

- i) Saprophytic bacteria decay organic material and release nutrients for use by green plants.
- ii) Rhizobium converts the nitrogen into nitrates in the soils.
- iii) Bacteria manufacture vitamin B<sub>12</sub> and K.
- iv) Bacteria destroys harmful organisms in sewage during sewage treatment.
- v) Used in industrial processing of food like vinegar, cheese and yoghurt.
- vi) Symbiotic bacteria in ruminants help in digesting cellulose by secreting cellulase enzyme.
- vii) Bacteria cause decay and food spoilage.
- viii) Denitrifying bacteria converts nitrates into free nitrogen in the soil.
- ix) Parasitic forms cause diseases to both plants and animals like anthrax in man.

### KINGDOM PROTOCTISTA

Kingdom Protocista is made up of two sub-kingdoms namely **protozoa** and **algae**. Protocists show various life styles, some resemble the plants, some animals and some fungi. Those that make their own food like plants are the algae, those that do not make their own food are the protozoans.

### Characteristics of Protocists

They have a nucleus surrounded by a membrane

Cytoplasm has membrane bound organelles like mitochondria.

Some may have flagella or cilia for locomotion.

### Sub kingdom Protozoa

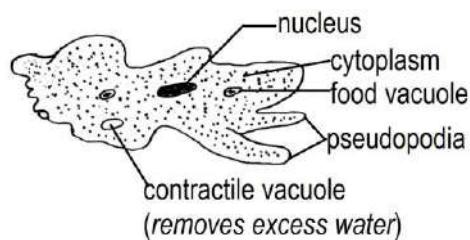
Protozoans are unicellular organisms. I.e. single celled organisms.

Examples of protozoans include **Amoeba, Paramecium, Euglena, Trypanosome and plasmodium**.

## 1. Amoeba

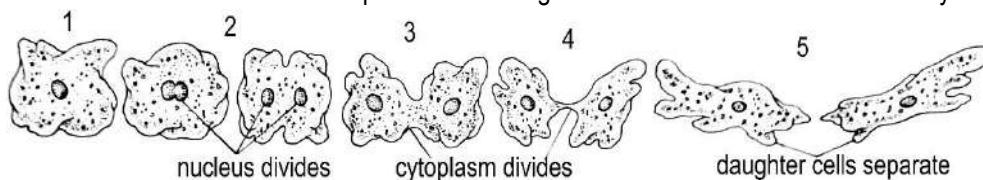
Amoeba is a free-living protozoa found at the bottom of ponds. It has temporary extensions called *pseudopodia* used for locomotion. The pseudopodia are also used for enclosing food particles which form food vacuoles.

The excess amount of water can be regulated and removed by **contractile vacuole**.



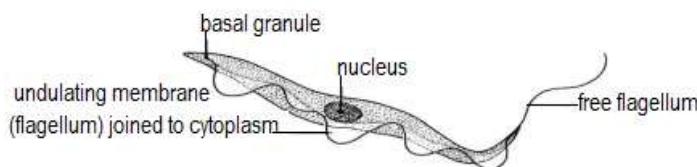
### Reproduction in amoeba

- Amoeba reproduces by **binary fission**.
- An amoeba ready to reproduce stops moving and rounds off.
- The nucleus then constricts and divides into two identical parts.
- The cytoplasm begins to constrict so that the separation of the remaining parts into 2 can occur.
- Two identical amoebae forms and move apart to feed and grow into mature amoebae before they divide again.



## 2. Trypanasoma.

These use the flagella for locomotion. Trypanosomes cause disease sleeping sickness in humans and Nagana in cattle. It is transmitted by the Tse tse flies.

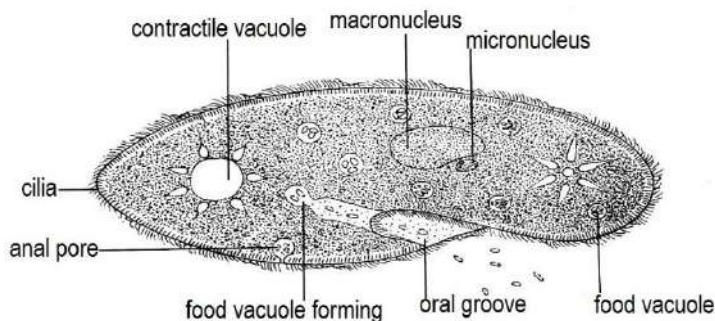


## 3. Plasmodia: Plasmodium causes malaria in humans.

## 4. Paramecium:

Paramecium is covered by rows of short, flexible hairs called cilia. Cilia are for movement and for capturing of food. It has two nuclei; a macro nucleus and micro nucleus. The macronucleus controls basic processes and the micronucleus controls reproduction.

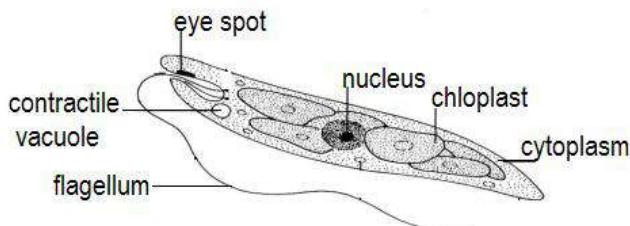
### The paramecium



## 5. Euglena:

Euglena is commonly found in water and in soil. It is photosynthetic and moves by means of flagellum.

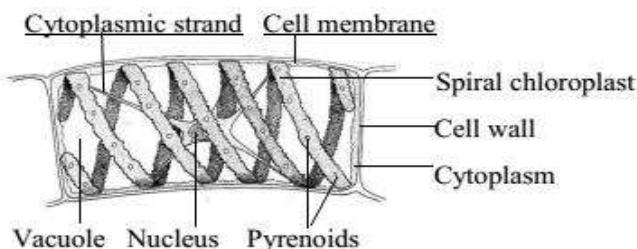
**Euglena**



## Sub kingdom Algae

This is a collective name for a varied group of phyla. They are normally aquatic or live in damp terrestrial habitats. The most common phylum is Chlorophyta (green algae); which comprises of unicellular algae and **filamentous algae (Spirogyra)**. It's found in fresh water of slow flowing water in ponds, streams, and lakes.

**One cell of spirogyra**



## Characteristics of spirogyra

- ✓ It is unbranched and filamentous.
- ✓ They have a green pigment called chlorophyll.
- ✓ Each cell has 1 to 7 spiral chloroplast from one end to another.
- ✓ The chloroplasts are ribbon-shaped, with wavy edges.
- ✓ Small protein bodies called pyrenoids are present on each ribbon like chloroplast and are used to store starch.
- ✓ The nucleus is in the center to control the activities of the cell.

## Role of algae in the environment

- ✓ Algae are used in the manufacture of agar which is used in laboratory experiments.
- ✓ They provide food for humans and fish.
- ✓ When they die, they sink at the bottom of the sea bed on which they can turn into oil.
- ✓ During photosynthesis, they release oxygen that is necessary for the respiration of animals that live in water.
- ✓ They pollute water, i.e. producing foul smell.
- ✓ They clog water pipes hindering the flow of water.

*Revision questions*

1. Which of the following combinations of words about amoeba are related
 

A. Pseudopodia, reproduction	C. Contractile vacuole, water
B. Nucleus, movement	D. Ectoplasm, digestion.
2. The smallest cellular animals belong to the
 

A. Protozoa	C. Bacteria
B. Viruses	D. Algae
3. Which of the following protozoa has cilia?
 

A. Amoeba	C. Euglena
B. Paramecium	D. Plasmodium
4. A euglena can be considered an animal or plant. State the characteristics that makes it;
  - i. An animal
  - ii) A plant

**KINGDOM FUNGI**

Kingdom fungi mostly have multicellular organisms such as mushrooms, puff balls, rusts, mould, toad stools, smuts, penicillium, mucor (grows on soil and dead plants) and rhizopus (common bread mould). Some are unicellular like yeast. The study of fungi is called **mycology**.

**General characteristics of Fungi**

- Their vegetative body called mycelium is composed of thread-like hyphae.
- The hyphae may be divided by cross walls (septa) into short, multinucleate sections.
- The fungi lack chlorophyll and their nutrition is non-photosynthetic.
- Some feed as parasites, others are mutualistic, but most are saprotrophic (secreting enzymes on to the food and absorbing the products of external digestion).
- They reproduce by means of spores.

**Kingdom fungi comprises of the following phyla:****1. Phylum Zygomycota (Zygomycetes):**

This comprises of the saprophytic fungi in soils and dung, and in decaying foods.

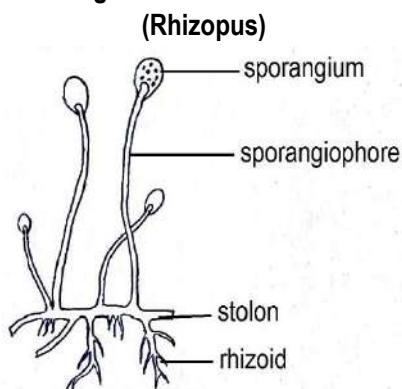
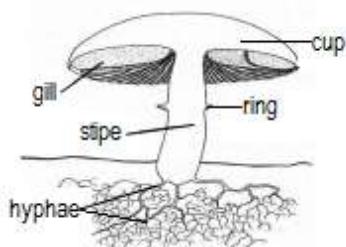
The mycelium is composed of hyphae without cross walls. Examples of the Zygomycetes are mucor, rhizopus and **mould**. Rhizopus is saprophytic fungus which grows on decaying food like bread and fruits.

**2. Phylum Basidiomycota (Basidiomycetes):**

They are composed of septate hyphae (divided by cross walls). Examples of Basidiomycetes are the **mushrooms**, toad stools, puff balls, rusts and smuts.

**3. Phylum Ascomycota (Ascomycetes):**

This consists of yeast. Yeast is mainly found on the surface of plants and animals, on animal mucous membranes and in soil and dung. Yeast feed on sugars, and they produce ethanol as a waste product. The ethanol formed is toxic to living cells, including the yeast cells themselves.

**Drawing of common bread mould (Rhizopus)****Drawing of a mushroom**

### Role/importance of fungi in the environment

- ✓ Fungi decay dead organic materials to release materials needed by green plants.
- ✓ Yeast is used in the production of alcohol from sugar canes, grapes and barley for brewers and wine makers.
- ✓ Fungi are important in bakeries during making of foods like bread, yeasts change sugar and starch to alcohol and carbon dioxide gas. The gas makes dough rise.
- ✓ Fungi produce antibiotics e.g. penicillin made from penicillium mould.
- ✓ Fungi provide food e.g. mushroom also used in making cheese.
- ✓ Fungi can spoil food e.g. Rhizopus and penicillium on the bread, cakes, fruits and jam.
- ✓ Fungi causes plant disease e.g. rust, brown patch, white bright, smut, etc.
- ✓ Fungi causes diseases to man e.g. ringworm, athlete's foot.

## KINGDOM PLANTAE

This kingdom contains multicellular organisms whose cells contain chlorophyll and are covered by a cellulose cell wall.

### General characteristics

- ✓ They are mostly green in colour thus carry out photosynthesis
- ✓ They are multicellular.
- ✓ Their cells are surrounded by cellulose cell wall.

The kingdom is divided into two main divisions i.e. Bryophyta and Tracheophyta

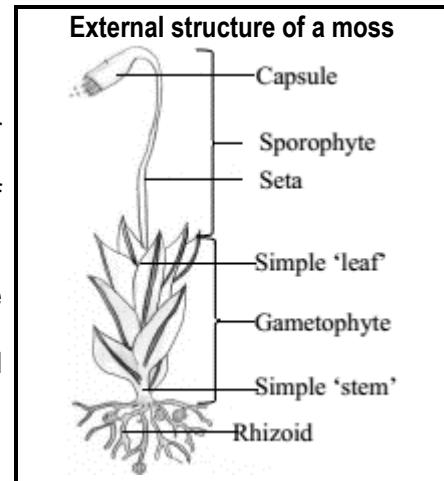
### DIVISION: BRYOPHYTA

The division is comprised of liverworts and mosses.

#### Main characteristics

- ✓ They have simple leaves
- ✓ They have rhizoids that are root-like structures. They are used mainly for anchorage.
- ✓ Plants lack vascular bundles thus depend on diffusion for movement of materials.
- ✓ They are found in sheltered and moist areas.
- ✓ Their life cycle consists of the two generations which alternate; a gametophyte and sporophyte generations.

Examples are mosses and liverworts which belong to 2 classes; Musci and hepaticae respectively.



### DIVISION: TRACHEOPHYTA

These also show alternation of generations. The sporophytes differentiate into roots, stems and leaves with lignified vascular tissues that are used for transportation of water and food. This division is divided into 2 sub-divisions; **Pteridophyta** and **Spermatophyta**.

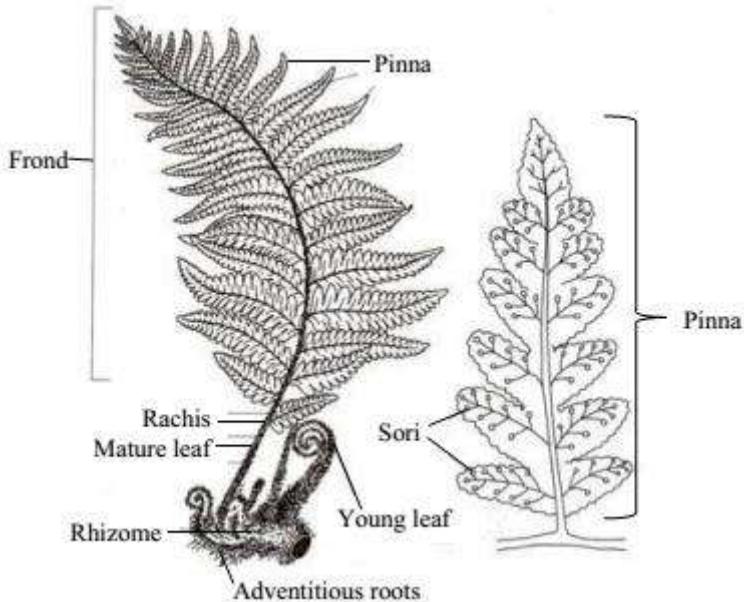
### Pteridophyta

This is made up of **ferns**. Ferns are commonly found in shaded places which are damp with cool temperature. Some ferns grow on trees as epiphytes.

#### Main characteristics

- ✓ Their plant body is called **prothallus**.
- ✓ The body of a sporophyte fern is divided into leaves, stem and roots.
- ✓ The leaves are called **fronds** while the stems are rhizomes.
- ✓ The spore forming structures are called sporophyte which occur on the underneath of a frond in clusters called **sori**.
- ✓ The sporophyte is the dominant generation while gametophyte generation is short lived.
- ✓ The rhizomes grow horizontally below the soil surface.
- ✓ Ferns have well-developed conducting tissues i.e. vascular bundles.
- ✓ They have the adventitious roots which anchor the plants into the soil and absorb materials.

### Drawing of the external structure of a fern plant



### **Spermatophyta**

The Spermatophyta comprises of well-developed plants which are adapted to a variety of habitats. The habitats include terrestrial and aquatic. The seeds are either contained inside the ovary wall or exposed.

#### **General characteristics**

- ✓ The body is divided into leaves, stem and root system
- ✓ Plants have complex and well developed vascular tissues.
- ✓ The supporting tissues like xylem, sclerenchyma and collenchyma, are found in leaves, stem and roots. Turgid parenchyma cells also provide support.

***The sub-division Spermatophyta is subdivided into two classes i.e. Gymnosperms and Angiosperms.***

#### **Gymnosperms (cone bearing plants)**

These are commonly found in high altitude areas.

Examples include pines, cypress, cedar tree, cycads, etc.

Gymnosperms refers to plants that do not bear flowers.

#### **Main characteristics**

- ✓ They are non-flowering plants.
- ✓ Their seeds are found in the cone scales.
- ✓ Have needle-like leaves which reduce the rate of transpiration.

#### **Angiosperms (flowering plants)**

These are flowering plants where seeds are enclosed in the ovary of the fruits.

#### **General characteristics**

- ✓ They bear flowers
- ✓ Their seeds are enclosed in the ovary from where the fruits develop
- ✓ The reproductive organs are found within the flower

***This class is divided into two sub-classes;***

#### **i) Monocotyledons:**

These are mainly grass family. Examples include wheat, rice, barley, star grass, sorghum, maize, millet, sugarcane

##### **Distinguishing characteristics of Monocots**

- ✓ Seeds have one cotyledon
- ✓ Have fibrous root system
- ✓ Have parallel veins in their leaves
- ✓ Vascular bundles are scattered in the stem cross section
- ✓ Flowers are held on an inflorescence

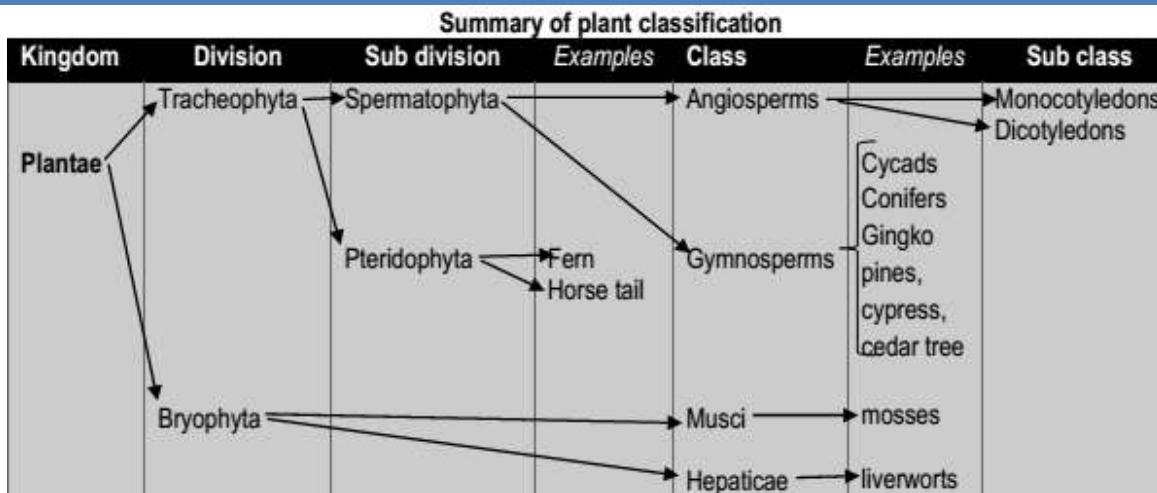
#### **ii) Dicotyledons:**

These include herbs, shrubs and trees.

Examples include beans, jacaranda, hibiscus, etc.

##### **Distinguishing characteristics of Dicots**

- ✓ Have seeds with two cotyledons
- ✓ They have tap root system.
- ✓ Have network (reticulate) venation.
- ✓ Leaves are generally broad and short.



## KINGDOM ANIMALIA

Kingdom Animalia has several phyla each of which consists of a variety of organisms. The phyla include:

Phylum	Examples
1. Porifera	sponges
2. Coelenterata	hydra
3. Platyhelminthes	'Flat' worms e.g. tapeworm
4. Nematoda	'Round' worms e.g. <i>Ascaris lumbricoides</i>
5. Annelida	'Ringed' worms e.g. earth worms
6. Mollusca	snails
7. Echinodermata	star fish
8. Arthropoda	cockroach
9. Chordata	man

### 1. Phylum: Porifera – the sponges

The phylum is made of many types of **sponges**

#### Sponge



#### characteristics

- Possess simple bodies which are hollow and sac-like.
- They are marine dwellers
- They have only one opening in their bodies.

### 2. Phylum: Coelenterata (Cnidarians)

They include the following; the **jelly fish**, **sea anemones**, **hydra** and **corals**.

#### Jelly fish



#### characteristics

- They are aquatic or marine organisms.
- They have soft bodies which are sac-like with body cavity called enteron.

### 3. Phylum Platyhelminthes ('flat' worms): The phylum consists of **flukes** and **tape worms**.

#### Characteristics:

- They have dorso-ventrally flattened body
- They have bilateral body symmetry.

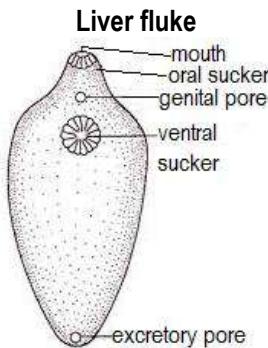
#### The phylum has 3 main classes;

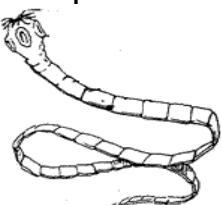
##### i) Turbellaria e.g. Planarians

- They are free living flat worms that live in wet soils, fresh water and seas.
- They have many simple eyes and cilia on the under surface of the body used for movement over stones and weeds.

##### ii) Trematoda e.g. Liver fluke

- They live as endo parasites in cattle and man.
- They have suckers for attachment on to the host.
- They suck digested food from the host.



**Tapeworm****iii) Cestoda e.g Tape worm**

- They live as endo-parasites in the gut of man, muscles of goats, cows and pigs.
- They have suckers and hooks for feeding and attachment on to the host.
- They have elongated bodies consisting of segments called proglottids.
- They absorb digested food directly from the host.

**4. Phylum: Nematoda ( round worms)**

The phylum has the examples like hookworms, pin worms, guinea worms, whip worms and *ascaris lumbricoides*.

**characteristics**

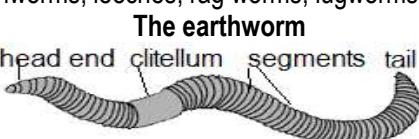
- They have unsegmented bodies.
- They have elongated and cylindrical bodies pointed at both ends.
- Some are parasitic and others are free living.

***Ascaris lumbricoides*****5. Phylum: Annelida (ringed worm)**

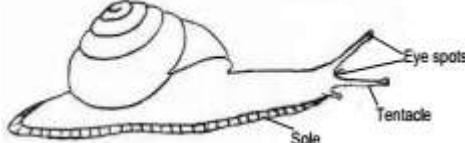
These are the ringed or segmented worms e.g. earthworms, leeches, rag worms, lugworms, etc.

**characteristics**

- The body wall has three body layers of cells (triploblastic) i.e. ectoderm (outer), mesoderm (middle) and endoderm (inner).
- They are hermaphrodites and reproduce sexually but they often promote cross fertilization.
- They have bodies divided into sections called septae.
- Externally the body shows ring-like segments.

**6. Phylum: Mollusca**

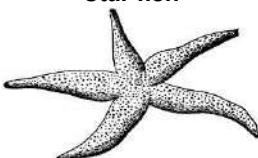
Examples include snails, slugs, octopus, squids, mussels and oysters.

**Garden snail****Characteristics**

- They have soft bodies.
- Nearly all have shells with exception of octopus and squids.

**7. Phylum: Echinodermata**

These are marine organisms. Examples are bristles star, sea urchin, sea lilies, sea star, star fish, sea cucumber.

**Star fish****Characteristics**

- The body has three layers (triploblastic) i.e. ectoderm (outer), mesoderm (middle) and endoderm (inner).
- They have feet for locomotion and capturing food (feeding).
- They have spiny skin which is a hard plate.

**8. Phylum: Arthropoda**

Arthropoda has a wide variety of animals.

**Characteristics:**

- They have a segmented body.
- They have jointed limbs and appendages.
- They have an exoskeleton.

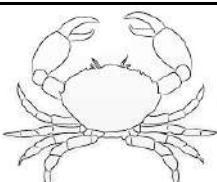
The exoskeleton is made up of chitin which is fairly hard but flexible. ***The exoskeleton has the following functions:***

- It provides support to terrestrial arthropods.
- It provides points of attachment for the muscles.
- It prevents the body from drying by secreting wax.
- It protects the organism from mechanical injury.

Phylum Arthropoda comprises of classes **Crustacea, Chilopoda, Diplopoda, Insecta and Arachnida**.

**1. Class: Crustacea**

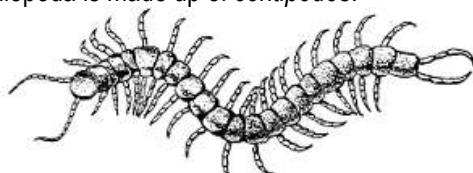
Examples of Crustaceans include crabs, crayfish, lobsters, prawns, woodlice and shrimps.

**Distinguishing characteristics**

- ✓ Their body is covered by a carapace. A carapace is a hard shell.
- ✓ Their body is divided into two parts. Their head and thorax are fused to form a **cephalothorax**. The second division is the abdomen.
- ✓ They have a pair of compound eyes each on a raised stalk.

**2. Class: Chilopoda**

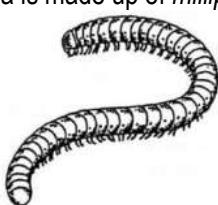
Chilopoda is made up of *centipedes*.

**Characteristics**

- ✓ They have a clearly defined head, the rest of the segments are similar.
- ✓ They have dorso-ventrally flattened body.
- ✓ They have a pair of long antennae.
- ✓ They have biting mouth parts known as mandibles.
- ✓ They have one pair of legs on each body segment.
- ✓ They are carnivorous.

**3. Class: Diplopoda**

Class Diplopoda is made up of *millipedes*.

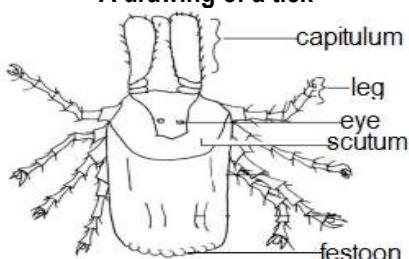
**Characteristics**

- ✓ They have a clearly defined head, the other segments are similar.
- ✓ They have a cylindrical body.
- ✓ They have one pair of antennae.
- ✓ They have biting mouth parts known as the mandibles.
- ✓ They have two pairs of legs on each body segment.
- ✓ They are herbivorous.

Millipedes are common in damp places.

**4. Class: Arachnida**

Arachnids are terrestrial arthropods. Examples of arachnids include spiders, ticks, scorpions and mites.

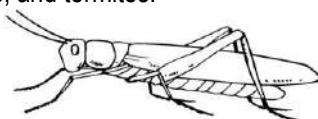
**A drawing of a tick****Distinguishing characteristics of arachnids**

- ✓ They have **two main** body parts. The head and thorax are fused to form the cephalothorax and the second part is the abdomen.
- ✓ They have simple eyes.
- ✓ They have **four pairs (8 legs)** of walking legs.
- ✓ They use lung books for gaseous exchange.

**5. Class: Insecta**

Insects are the largest group of arthropods.

They occupy every habitat on earth in such places as air, soil and water. However, they mainly inhabit terrestrial habitats. Examples of insects include grasshoppers, houseflies, butterflies, bees, and termites.

**Distinguishing characteristics of insects**

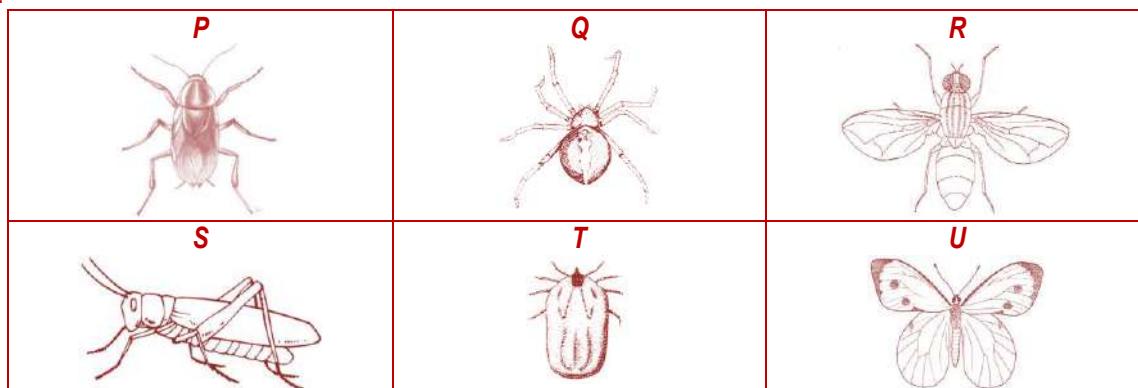
- i) Insects have three main body parts, namely: the head, thorax, and abdomen.
- ii) They have three pairs of walking legs on the thorax. One pair of walking legs per segment of the thorax.
- iii) They have three segments of the thorax i.e. prothorax, mesothorax and metathorax.

**Some common orders of insects**

Order	Characteristic features of the order <i>(The word ptera means wing).</i>	Examples
<b>Dictyoptera</b>	Have hard outer wings and soft membranous inner wings.	Cockroach and praying mantis.
<b>Hymenoptera</b>	Have two pairs of membranous wings.	Wasps, bees and ants.
<b>Coleoptera</b>	Outer wings hardened to form horny covers covering the inner membranous wings.	Beetles and weevils.
<b>Isoptera</b>	Equal length of the two pairs of wings (swarming adult termite).	Termites
<b>Lepidoptera</b>	Have membranous wings covered with scales. Have sucking mouth parts.	Moths and butterflies
<b>Diptera</b>	They have a single pair of wings. In houseflies, second pair is reduced into halteres for balancing.	Mosquitoes and houseflies
<b>Orthoptera</b>	Have leathery straight fore wings and membranous hind wings.	Grasshopper, locusts and crickets

**Revision questions**

An S.1 student was provided with the following specimens labelled **P**, **Q**, **R**, **S**, **T**, **U**. Use them to answer the questions that follow.



1. To which phylum do the above specimens belong? (1 mark)
2. Give three main characteristics of organisms under the phylum you have mentioned above. (3 marks)
3. Which organisms **P**, **Q**, **R**, **S**, **T** and **U** shown above belong to class Insecta? (1 mark)
4. Give three reasons for the above grouping into class Insecta. (3 marks)
5. State the orders to which the specimens **P**, **S** and **U** belong. (3 marks)
6. i) Other than class Insecta, which other class is represented in the specimens shown above? (1 mark)  
ii) Mention one characteristic feature typical of organisms under the above mentioned class in 6) (i). (1 mark)
7. The above organisms are all small sized. State one advantage of the above statement. (1 mark)

## 9. Phylum: Chordata

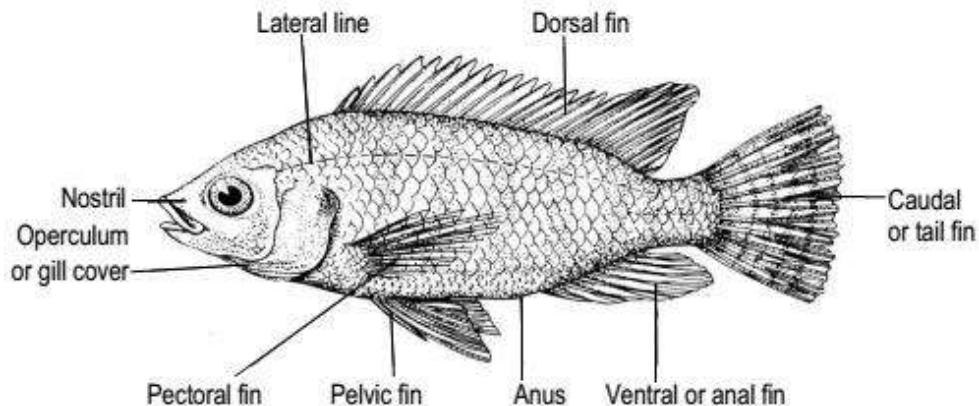
Chordate refers to animals which possess a notochord.

### Main characteristics

- ✓ The presence of a notochord during the early stages of development.
- ✓ They have bilateral symmetry.
- ✓ The body is composed of head, trunk and usually a tail at some stage of development.
- ✓ Possess a hollow dorsal nerve cord.

This phylum mainly consists of the vertebrates and they are divided into 5 classes. The 5 classes include the following;

### 1) Pisces (fishes) e.g. tilapia and the Nile perch



### Characteristics

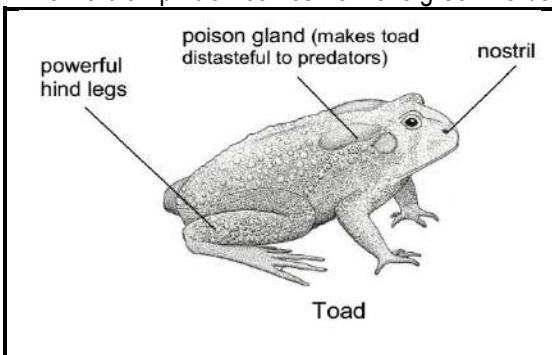
- ✓ They have a streamlined body.
- ✓ They have scales on their skin.
- ✓ They breathe using gills.
- ✓ They have fins for swimming.
- ✓ Their eggs are fertilized outside the body (external fertilization).

**Revision questions**

1. Outline functions of each labelled part on a tilapia fish above.
2. How is the fish adapted to its mode of life?

**2) Amphibia**, e.g. newt, salamander, toad and frog.

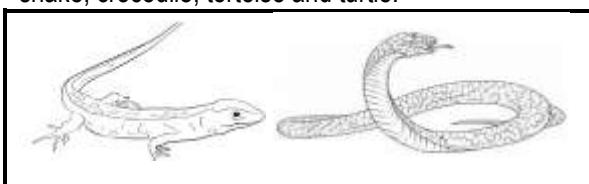
The word amphibian comes from two greek words: amphi- (both) and bios (life).

**Characteristics**

- They spend part of their life (as larvae or tadpoles) in water, and part of their life as adults on land.
- They live on land but require water for breeding.
- Amphibians have a soft moist skin without scales.
- They have visceral clefts at the larval stages which are used as gills for gaseous exchange. Adult amphibians use lungs and the skin surface for gaseous exchange.
- Amphibians have middle and an inner ear but no external ear. However, they have a tympanic membrane also called the ear drum.

**3) Reptilia**

Reptiles are mainly terrestrial with the exception of the turtle which lives in water. Examples of reptiles include the lizard, snake, crocodile, tortoise and turtle.

**Characteristics**

- Reptiles have dry skin with horny scales.
- Some reptiles have a three-chambered heart; two auricles and one ventricle. Others have four chambered heart for example crocodile.

**4) Aves - birds**

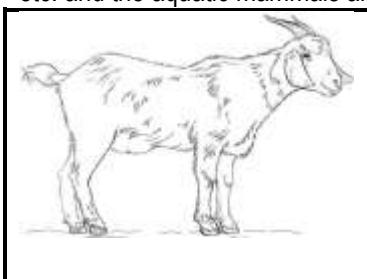
Aves refer to birds. Examples of birds include eagle, ducks, flamingo, heron, dove, etc.

**Characteristics**

- ✓ The skin is covered in feathers, except the legs which are covered by horny scales. The feathers keep the bird warm and also used for flight.
- ✓ The skeleton is made of hollow bones. The hollow and light bones reduce weight and enable flight.
- ✓ They have two pairs of pentadactyl limbs. The fore limbs modified into wings for flight while the hind are feet for walking or swimming.
- ✓ They lay eggs in calcareous shells.

**5) Mammalia**

Mammals comprise a wide variety of animals. Examples of terrestrial mammals are cows, pigs, goats, monkeys, rats, lions etc. and the aquatic mammals are seals, dolphins and whales.

**Characteristics**

- ✓ The skins of mammals are covered by hair or fur.
- ✓ The skin has sweat glands called sebaceous glands.
- ✓ They have an endoskeleton made up of bones.
- ✓ They have four types of teeth for feeding.
- ✓ They have muscular diaphragm which separates the thoracic organs from the abdominal organs.
- ✓ They have mammary glands.

## EXTERNAL FEATURES, LIFE CYCLES AND ECONOMIC IMPORTANCE OF SELECTED INSECTS

A branch of biology that deals with the study of insects is known as entomology. Insects exhibit the longest level of organization in animals, i.e. social organization especially in bees, wasps and ants. They are the only invertebrates which can fly. They are the most successful arthropods on land.

**Their success on land is attributed to:**

- i) Evolution of special organs for flight. The wings which enable them to diversify and colonize new areas.
- ii) Impervious exoskeleton made of chitin which has protected them from drying up in the terrestrial environment.
- iii) The small size has enabled them to tackle every place.
- iv) Excretion of toxic products as uric acid has enabled them to conserve water.
- v) Tracheal system has enabled them to carry efficient gaseous exchange.
- vi) Disposition of legs enables them to maintain swift locomotion.
- vii) The compound eyes that provide wide field of view for food and enemies.
- viii) The modified mouth parts that suit a variety of food materials.
- ix) The high reproductive rate that ensures enormous number of offsprings is produced.

Some insects are directly beneficial to man these include pollinators like butterfly, moth and bees others are beneficial indirectly such as parasitic pest species.

Harmful insects include those that directly live on man as parasite like lice, flies, mosquitoes, tsetse flies.

Insects have an exoskeleton which is rigid and prevents expansion of the insect during growth. Before the insect grows, it sheds the exoskeleton in a process called moulting (ecdysis).

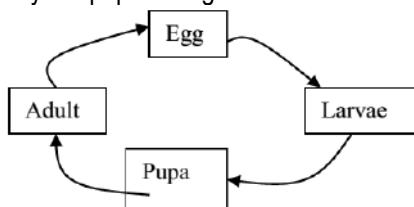
Without the exoskeleton, the insect then expands and grows. A new exoskeleton then forms and growth stops until another moulting. Successive moults result into formation of a new form of the insect. This is called **metamorphosis**.

### Insect metamorphosis

Metamorphosis is the gradual developmental change from the eggs to the adult stage. It occurs in insects and amphibians. Insect metamorphosis is divided into two types.

#### Complete metamorphosis (holometabolous)

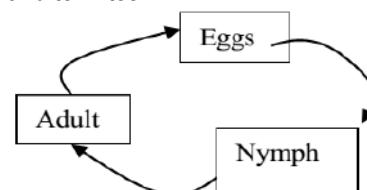
This is a gradual development change where the eggs hatch into larvae and the larvae change into pupa and finally the pupa change into an adult. It involves four stages.



Insects, which undergo complete metamorphosis, include butterflies, mosquitoes, houseflies, tsetse flies, bees, wasps, and beetles.

#### Incomplete metamorphosis (hemimetabolous)

This is the gradual developmental change where an insect undergoes only 3 stages, when eggs hatch, they give rise to adult-like nymphs which latter change into adults. Insects showing this include locusts, grasshoppers, bedbugs, cockroaches, and termites.



## COCKROACH (*Periplaneta americana*)

### Classification

Taxon		Reason
Kingdom	Animalia	1. They have a mouth.
Phylum	Arthropoda	1. It has a hard exoskeleton. 2. It has segmented body. 3. It has jointed legs.
Class	Insecta	1. It has three pairs of jointed legs. 2. It has three main body parts i.e. head, thorax and abdomen. 3. It has thorax divided into three segments.
Order	Dictyoptera	1. It has a pair of hard fore (outer) wings.

**NB:** Other insects belonging to the order Dictyoptera include; weevils, beetles, ladybirds.

**Habitat:**

Cockroaches live in dark, dirty and damp warm places e.g. pipes that carry sewage. During day they live in crevices of walls, cupboards, underneath drawers and in boxes.

They are active at night thus referred to as nocturnal.

**External features of a cockroach**

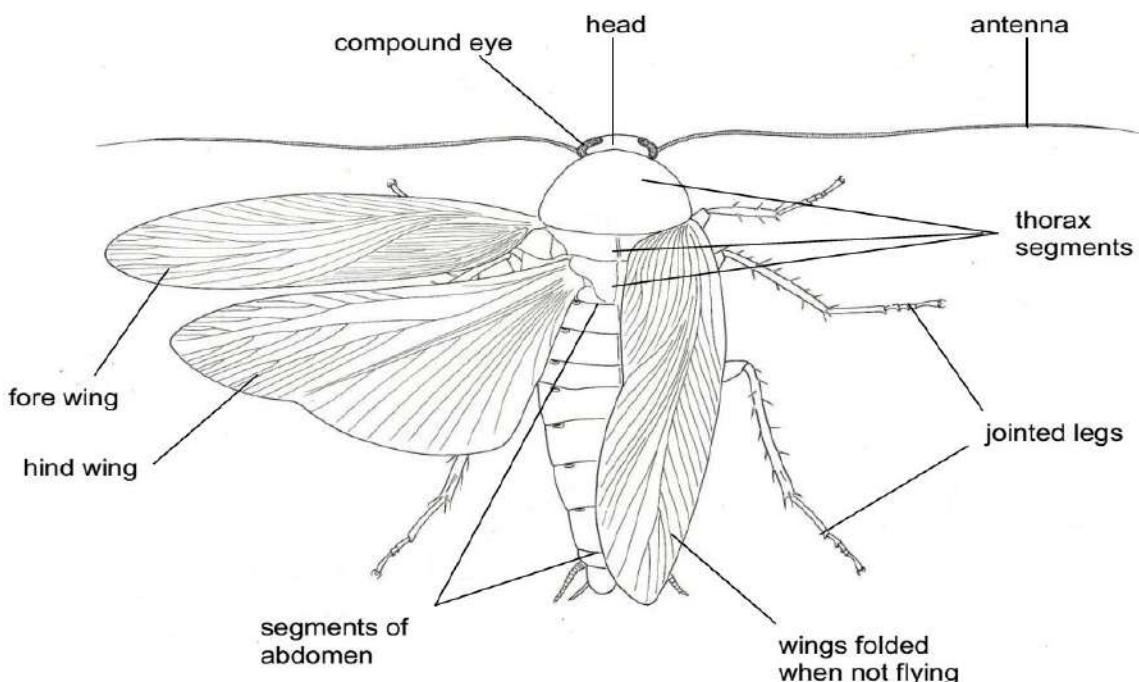
It has a dorsal- ventrally flattened body.

It is brown in colour.

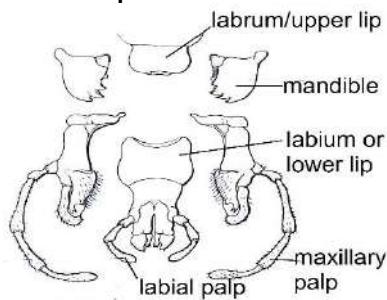
It has a hard thick exoskeleton made of chitin.

The body is made up of **three main divisions**, each segment of thorax and abdomen consists of dorsal plate tegmen (plu:- terga) a ventral plate, sternum (plu-sterna) and two internal plates, pleura.

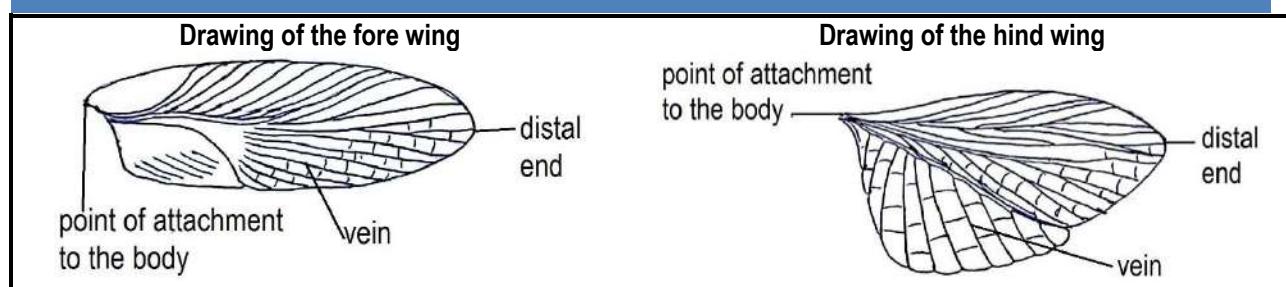
**A drawing of the dorsal view of the cockroach with the left wings spread**

**The head**

- The head is small and pear-shaped.
- It bears a large kidney-shaped pair of compound eyes.
- In front of each compound eye lies a long thread-like segmented antennae (feelers). These are sensitive to touch, smell and vibrations.
- The head has biting and chewing mouth parts—mandibles for cutting and crushing food, maxillary palps for holding food, a labrum (upper lip) and labium (lower lip).
- The head is connected to the thorax by short neck.

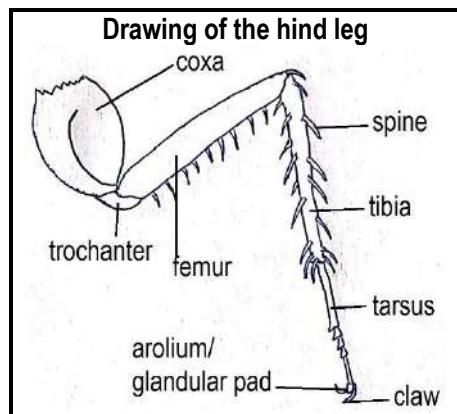
**Mouth parts of a cockroach****The thorax**

- The thorax consists of three segments: the prothorax, the mesothorax and the metathorax.
- Each of the segments bears a pair of jointed legs on its ventral surface.
- The legs have sharp spines for defense.
- Each leg ends in a pair of **sharp claws for walking on rough surfaces** with a **soft glandular pad/arolium between claws for walking on smooth surfaces**.
- The prothorax is the largest of the thoracic segment
- The paired wings are attached to dorsal surface of mesothorax and metathorax.
- The anterior (fore) wings are narrow, brown, and leathery and are called elytra or tegmina. They are not used for flight but for covering and protection of broad, membranous inner/hind wings when at rest.



### Revision questions

1. State similarities and differences between the fore wing and hind wing.
2. How is the leg of a cockroach adapted to its function?



### The abdomen

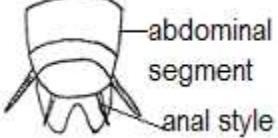
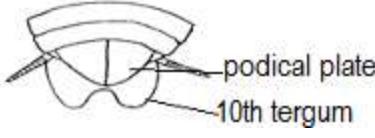
This is made up of 10 segments. Only seven are easily seen because tergum of seventh segment covers the 8<sup>th</sup> and 9<sup>th</sup> segment. The flat broad tergum of the 10<sup>th</sup> segment bears a pair of jointed sensory structures the cerci. Males have another additional pair of short structures, the styles.

### Identification of a cockroach's sex

In males, there is a pair of slender **styles** that are used to hold and manipulate the female during copulation.

In females, there is a pair of boat shaped structures called the **podical plates** used for holding eggs.

### Differences between a male and female cockroach:

Male	Female
Has a narrow abdomen	Has a broader abdomen
Lack ootheca	Has ootheca which develops after fertilization.
Has rod-shaped structures called styles on the 9 <sup>th</sup> abdominal segments.	No styles on the 9 <sup>th</sup> abdominal segment.
No podical plates.	Has podical plate for carrying eggs.
	

### Adaptation of a cockroach to its environment

- i) Cockroaches have dorso-ventrally flattened bodies to fit in narrow places.
- ii) Its body is dark brown to camouflage well against a dark background.
- iii) They are smooth and greasy to escape easily from predators.
- iv) It has one pair of long antennae for feeling and smelling the area around their body.
- v) Since they are omnivorous, they survive on a wide variety of food materials.
- vi) Their nocturnal emergence renders them less liable to capture.
- vii) They have spines on their legs for defense.

### The life cycle of a cockroach

A cockroach undergoes incomplete metamorphosis. After mating, the fertilized eggs are stored in an egg-case called ootheca. The female carries ootheca for a number of days before depositing them in dark obscure places. Within a week, it turns dark brown.

After six weeks, the eggs hatch out into young, wingless and colorless cockroaches called nymphs. After 2 weeks they turn brown like adults but wingless. The nymph grows and undergoes ecdysis, about 7 times and every two ecdysis, the nymphs are called instars. After the last ecdysis, the nymph becomes adult cockroach which has a life span of about 2 months.

**Biological role/importance of cockroaches**

- They destroy clothes, books, shoes, furniture and spoil food.
- They spread disease causing germs such as cholera, dysentery etc. especially those in latrines
- They contaminate food if not properly covered.
- They are food to some organisms like birds.
- They are used in biological studies as specimens.

**Control of cockroaches**

- Improve personal and public hygiene.
- Use of environmentally friendly insecticides like dooms, etc.
- Use of biological control methods.
- Polish the walls of the house to close the small crevices.

**CITRUS BUTTERFLY (*Papilio demodocus*)****Classification:**

Taxon		Reason
<b>Kingdom</b>	Animalia	Has mouth for feeding.
<b>Phylum</b>	Arthropoda	It has a hard exoskeleton. It has segmented body. It has jointed legs.
<b>Class</b>	Insecta	It has three pairs of jointed legs. It has three main body divisions. It has thorax divided into three segments.
<b>Order</b>	Lepidoptera	It has scales on its wings.

**Habitat:**

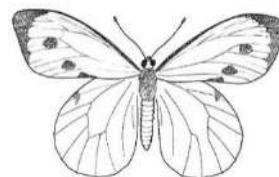
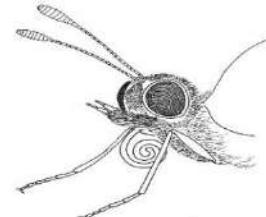
Butterflies live in gardens and forests and where they can feed on nectar from flowers. They are active during day.

**External features**

The butterfly has three body divisions the head, thorax, and abdomen.

**The head:**

- The head bears two large, bulging brown compound eyes.
- There are two simple eyes (ocelli) behind the compound eyes.
- Above eyes is pair of antenna. These are long jointed and lobbed at the ends. They are sense organs for touch and smell.
- The head has a proboscis adapted for sucking nectar. The proboscis is long, hollow and a flexible tube. This has a modified pair of maxillae which coils up when not in use.

**The head****The thorax:**

- The thorax consists of prothorax, mesothorax and metathorax. These segments are covered by hairs and divisions are not clearly seen.
- Each thoracic segment bears a pair of jointed walking legs.
- The mesothorax and Metathorax in addition bear a pair of wings each which are large with powdery scales.

**The abdomen:**

- The abdomen has ten segments and each bears a pair of spiracles.
- It is hairy and obscures the segmentation.

**Butterflies and moths**

Butterflies and moths are both members of the Lepidoptera. Although they appear very similar, there are differences in their bodies and behaviour.

**Differences between a butterfly and a moth**

Butterfly	Moth
It is diurnal i.e. active during day time	Nocturnal i.e. active during night
Wings are held upright at rest.	Wings are held horizontally at rest.
Small body	Fatter body
Body brightly colored	The body is dull coloured.
Antennae are clubbed or knobbed at the tip	Antennae are pointed at the tip and feathery
Pupate above the ground	Pupate in cocoons or in the soil

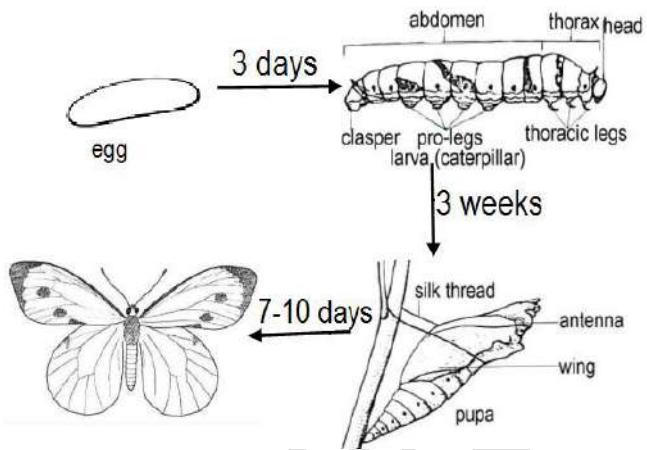
### The life cycle of a butterfly

A butterfly undergoes complete metamorphosis.

A fertilized female butterfly lays eggs.

**The eggs hatch into larvae (caterpillars)** after about 3 days. The thoracic segments of the larvae bear each a pair of true walking legs and abdomen bearing a pair of claspers on the last segment.

After three weeks of feeding on leaves, **the caterpillar develops to pupa**. The pupa is inactive i.e. it does not feed nor move. *During pupa stage, there is internal reorganization of tissues involving the formation of wing, compound eyes, proboscis and reproductive organs.* This lasts for about 7-10 days after which the pupa case split along the dorsal region. After about 1 hour while the wings expand and dry, the adult butterfly emerges ready to fly, feed, mate and lay more eggs.



### Biological role/importance of citrus butterflies

- From the cocoons of butterfly, silk threads are obtained for making silk clothes.
- The larvae spoil the leafy vegetable with fecal drops such as dodo.
- The scales may be respiratory hazards when inhaled.
- The caterpillar stage destroys crops by feeding on green leaves of crops.
- Some caterpillars feed on insects thus help in destroying insect pests.
- The butterflies also are of much importance to the farmers in pollinating flowers of the crops.
- They are source of food to some organisms like birds.

### Control measures against butterflies

- Killing the caterpillars with environmental friendly insecticides. Caution should be taken not to kill the adult butterflies because of their role in pollinating crop plants.
- Use of biological control methods like feeding them to birds.
- By hand picking of the infected leaves and burning or burying them. This destroys the eggs.

### THE HOUSE FLY (Musca domestica)

#### Classification

Taxon		Reason
Kingdom	Animalia	Has mouth for feeding
Phylum	Arthropoda	It has a hard exoskeleton. It has segmented body. It has jointed legs.
Class	Insecta	It has three pairs of jointed legs. It has three main body divisions. It has thorax divided into three segments.
Order	Diptera	It has a single pair of transparent wings.

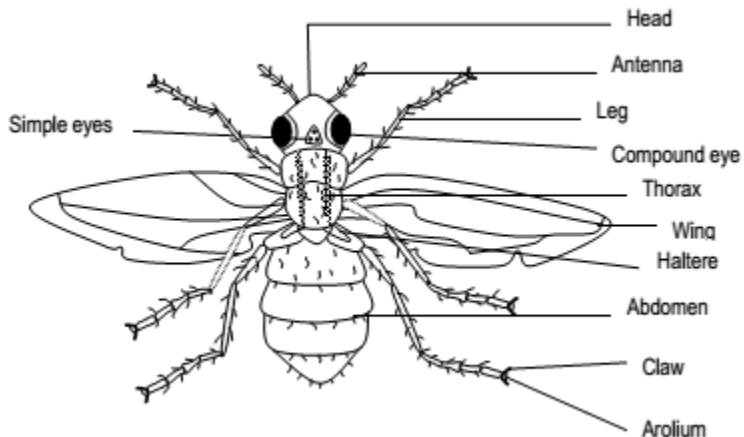
Examples of members in the order include mosquitoes, housefly, tsetse fly etc.

**Habitat:** House flies live in filthy or dirty places such as toilets, dust bins, etc.

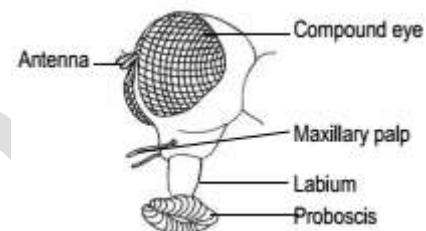
### External features of a house fly

The body of the housefly is divided into three main parts, head, thorax and abdomen.

Its body is hairy.

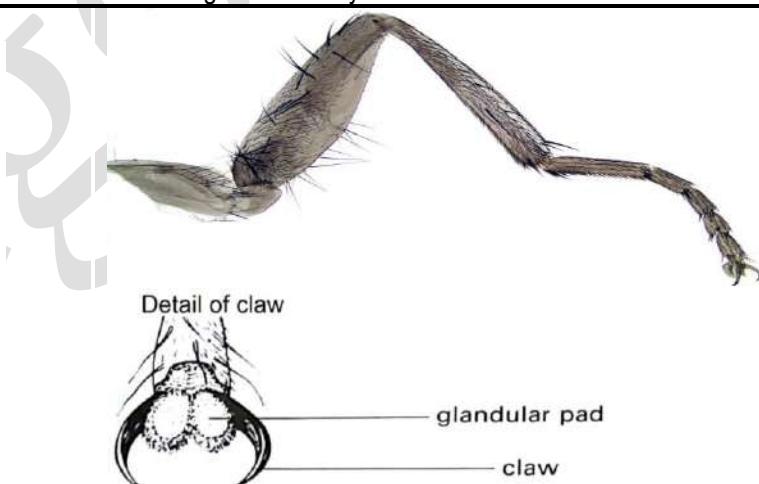
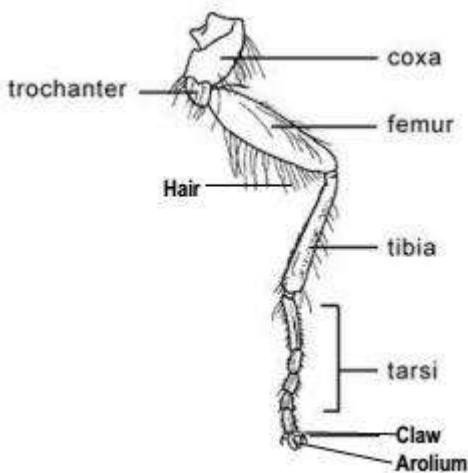
**Drawing of the dorsal view of a house fly****The head:**

- The head bears three simple eyes (ocelli) arranged in triangle and on each side is a large or prominent compound eye.
- The antennae are short with three joints with last having spine hair.
- The labium (lower lip) is modified into proboscis for sucking, which is expanded at the distal end to form a funnel shape.

**Drawing of the head of a house fly****The thorax:**

The thorax is divided into three segments with each segment bearing a pair of jointed, hairy legs.

The thorax bears one pair of transparent wings and halteres for balancing the house fly.

**Drawing of the hind leg of a house fly****Life cycle of a housefly**

*The housefly undergoes complete metamorphosis.*

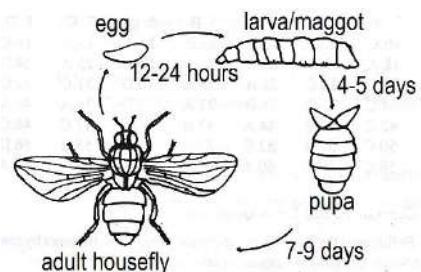
After mating, the female housefly lays eggs in batches. The eggs are laid on rotting matter such as meat or faeces, where it is warm and moist.

After about 12 to 24 hours, the eggs hatch into larvae. The larvae (maggots) are white and conical shaped.

After 4 to 5 days and shading its cuticle twice. It then moves to a drier region of the meat or faeces and pupates.

The cuticle hardens, darkens and becomes brown to form the pupa case. This forms a protective covering as internal reorganization of tissues takes place inside.

After 7 to 9 days, the pupa case bursts open, the adult fly emerges. The wings expand and harden and after a few hours, the fly flies away.



**Biological role/importance of house flies**

- i) They feed on faeces and manure heaps, hence help in garbage disposal.
- ii) They are vectors of diseases i.e. spread or transmit diseases such as dysentery, cholera, red eyes & trachoma.
- iii) They are a source of food for some organisms such as chameleons.
- iv) They are specimens for study purposes.

**Control of house flies and prevention of diseases they spread**

- i) Spraying with an insecticide such as pyrethrum to kill the adult.
- ii) Proper disposal of faeces in latrines with covers, so that flies cannot get to the waste to lay eggs.
- iii) Washing hands with soap and clean water after visiting the latrine and before eating or preparing food.
- iv) Disposing of wastes in such a way that flies cannot reach them. E.g. burning or burying them.
- v) Covering or storing food properly so that flies cannot settle on it.

**THE MOSQUITO****Classification:**

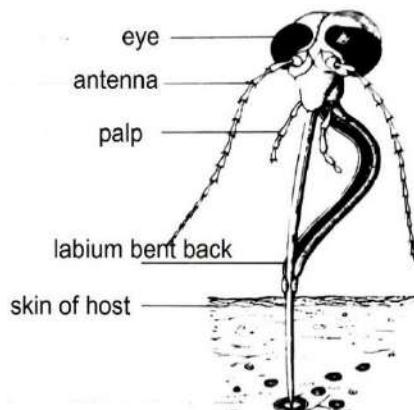
Taxon		Reason
<b>Kingdom</b>	Animalia	Has a mouth for feeding.
<b>Phylum</b>	Arthropoda	It has a hard exoskeleton. It has segmented body. It has jointed legs.
<b>Class</b>	Insecta	It has three pairs of jointed legs. It has three main body divisions. It has thorax divided into three segments.
<b>Order</b>	Diptera	It has two pairs of membranous wings, one pair reduced to halteres.

The mosquitoes are majorly found in the tropics and are best known for carrying disease germs. The important three genera are:

- i) Anopheles that are vectors of malaria.
- ii) Aedes which are vectors of yellow fever and dengue fever.
- iii) Culex, the vector of elephantiasis.

**External features of a mosquito**

- Has a pair of large compound eyes on the head.
- Has a pair of long segmented antennae.
- Has a pair of short segmented palps.
- Has a sharp, long piercing stylet.
- Has three pairs of long slender jointed legs.
- Has two pairs of wings, one pair reduced to halteres to provide balance.

**Head of female Anopheles mosquito****Mode of life of a mosquito**

- Hates light and like resting in dark places during day and comes out to feed at night.
- They feed mainly within late evening and early morning.
- Male mosquitoes feed on plant juices and nectar while the female feeds on blood.

### Life cycle of a Mosquito

It begins with mating and internal fertilization and is a complete metamorphosis. The difference however are observed for both anopheles and Culex mosquitoes.

Anopheles mosquito		Culex mosquito
Adult	Eggs	raft of eggs
Larva		siphon gills eye antenna mouth brush
Pupa		breathing trumpet antenna eye tail fin
Adult anopheles	Adult	Adult Culex mosquito

### Biological role of mosquitoes

- i) They are source of food to aquatic organisms like fish and frogs.
- ii) They are vectors for malaria, yellow fever and elephantiasis:
  - Aedes species carry a virus which causes Dengue. They also transmit the yellow fever virus which cause yellow fever.
  - The Culex species carry **filarial worms which cause elephantiasis**. It is not a killing disease but causes discomfort due to large swelling of the legs and/ arm.
  - The female anopheles mosquito transmits malarial parasites, **plasmodia** which cause malaria.

### Symptoms of malaria

- |   |   |
|---|---|
| <ul style="list-style-type: none"> <li>✓ A Person with malaria has very high fever.</li> <li>✓ Headaches.</li> <li>✓ Sometimes vomiting.</li> <li>✓ Pain in the joints and sometimes the general body.</li> </ul> | <ul style="list-style-type: none"> <li>✓ There is alternate cold and shivering spells as well as hot sweating.</li> <li>✓ Loss of appetite.</li> <li>✓ Anemia.</li> <li>✓ Enlarged liver and spleen.</li> </ul> |
|---|---|

Malaria may cause convulsions and sometimes death in children and abortions in pregnant women due to destruction of red blood cells by the parasites.

### Control of spread of malaria

To control the spread of malaria, effective control of the mosquitoes that carry the plasmodium parasites is the way to go.

#### Appropriate measures include;

- ✓ Destroying the breeding places where larvae develop from by draining or applying a film of oil over the water surface to prevent oxygen reaching the mosquito larva.
- ✓ Burning or burying all empty containers to prevent water from collecting during the rainy season.

- ✓ Clearing bushes around homestead. Mosquitoes like to rest and breed on them during the rainy season.
- ✓ Biological control which involves the introduction of fish into water bodies which feed on the larvae and pupa.
- ✓ Mosquitoes can be killed by spraying with insecticides using special sprayers.
- ✓ Removal of small water containers such as old tins, bottles, and drainage channels, so as to reduce breeding sites.
- ✓ Protecting our bodies from mosquito bites by using mosquito nets at night as well as wearing clothes which cover both legs and arms in the evening
- ✓ Applying mosquito repellent cream to the body.

#### Differences between Anopheles and Culex

Anopheles	Culex
i) Eggs are laid singly	Eggs are in rafts
ii) Eggs have air floats to keep buoyant	Eggs have air float
iii) Eggs are boat shaped	Eggs are cigar shapes
iv) Larva lies parallel to the water surface	Lies at an angle to the water surface
v) Larva has a pair of spiracles for breathing	Larva has siphon for breathing
vi) Adult at rest lies at an angle to the object	At rest lies parallel to the object

#### THE HONEY BEE (*Apis mellifera*)

##### Classification

Taxon		Reason
Kingdom	Animalia	Has a mouth for feeding.
Phylum	Arthropoda	It has a hard exoskeleton. It has segmented body. It has jointed legs.
Class	Insecta	It has three pairs of jointed legs. It has three main body divisions. It has thorax divided into three segments.
Order	Hymenoptera	It has transparent membranous wings.

##### Habitat: Bee hive

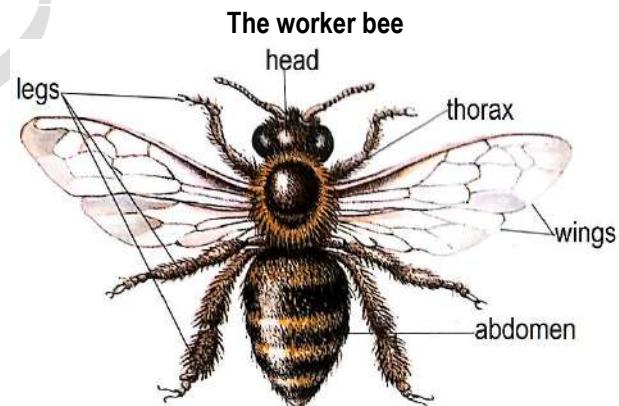
Other examples of insects under hymenoptera include ants, gall wasps, etc.

Generally, bees are social insects and live in colonies (large numbers) in bee hives. They show division of labor among the castes for instance;

The queen produces other bees.

The drone fertilizes the queen.

The workers have a number of duties among which include collecting food and cleaning the hive.



##### External features on the honey bee especially worker include:

- ✓ It has a cylindrical or rounded body.
- ✓ Has a hard exoskeleton.
- ✓ The body is segmented.
- ✓ It is hairy
- ✓ It has 3 main divisions i.e. head, thorax and abdomen.

##### The Head:

- ✓ The head is not fixed on the thorax and therefore it is free to move (mobile).

- ✓ Has both biting and sucking mouth parts. The mandibles are blunt, with a curved tongue. The proboscis is tubular. It is used for lapping during feeding and also used for construction, the glossa is also modified for sucking.
- ✓ Has hairy and segmented labial palps.
- ✓ Has one pair of large compound eyes.
- ✓ The eyes are dorsal laterally/ anteriorly positioned.
- ✓ Has a pair of short segmented antennae.

**Thorax:**

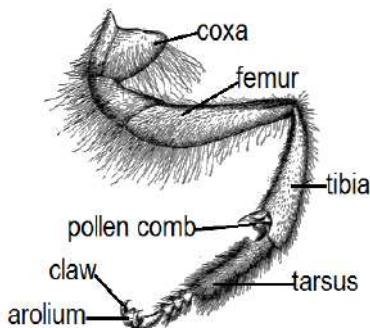
- ✓ It is hairy.
- ✓ Has three main segments.
- ✓ Has two pairs of membranous wings.
- ✓ Has 3 pairs of hairy jointed limbs which differ in various aspects as shown below.

**Thorax:**

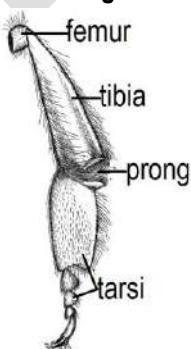
- ✓ It is hairy.
- ✓ Has three main segments.
- ✓ Has two pairs of membranous wings.
- ✓ Has 3 pairs of hairy jointed limbs which differ in various aspects as shown below.

**The fore leg**

The fore leg has a pollen comb located at the end of the tibia. This is used for cleaning pollen off the head.

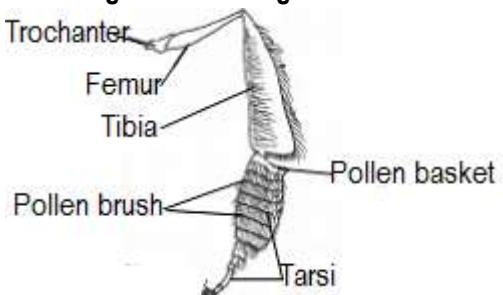
**A drawing of the fore leg of a honey bee****The middle leg**

These legs possess a hair like structure, prong at the distal end of the tibia. The prong is used for scooping pollen grains out of the pollen basket on the hind leg.

**Drawing of the middle leg cut off from the femur****Hind leg**

The leg is hairy with pollen baskets, which are responsible for carrying pollen grains.

These have pollen baskets on their tibia which are used for carrying the collected pollen grain to the hive. They also possess tufts of hairs on the tarsus called **pollen brush** which are used for cleaning pollen off the body into the basket on the other leg.

**Drawing of the hind leg without the coxa****Abdomen:**

The abdomen is short, cylindrical, hairy and segmented with a hard/ tough cuticle/ exoskeleton.

**Roles played by the different castes in bees****1. The Worker bees:**

The workers do not lay eggs because they are infertile/sterile females. They are the smallest in size among the bees. They perform the following duties among others:

- i) Cleaning the bee hive by eating away dirt and rubbish.
- ii) Feeding the old grubs (larva) on honey and pollen.

- iii) Packing and storing honey and pollen in the cells of the honey comb.
- iv) Feeding the young grubs on their milk produced by their own salivary glands.
- v) Producing wax from their wax glands.
- vi) Field work to collect food and pollen.
- vii) Guarding the bee hive.

## 2. The drone bees:

These are male bees. They are larger than workers and are usually very few in the hive. Their role is to fertilize the queen after which they are stung to death by workers.

## 3. The queen:

This is the fertile female bee. It is usually one in the hive. Its work is to produce all the other bees in the hive.

The Queen bee



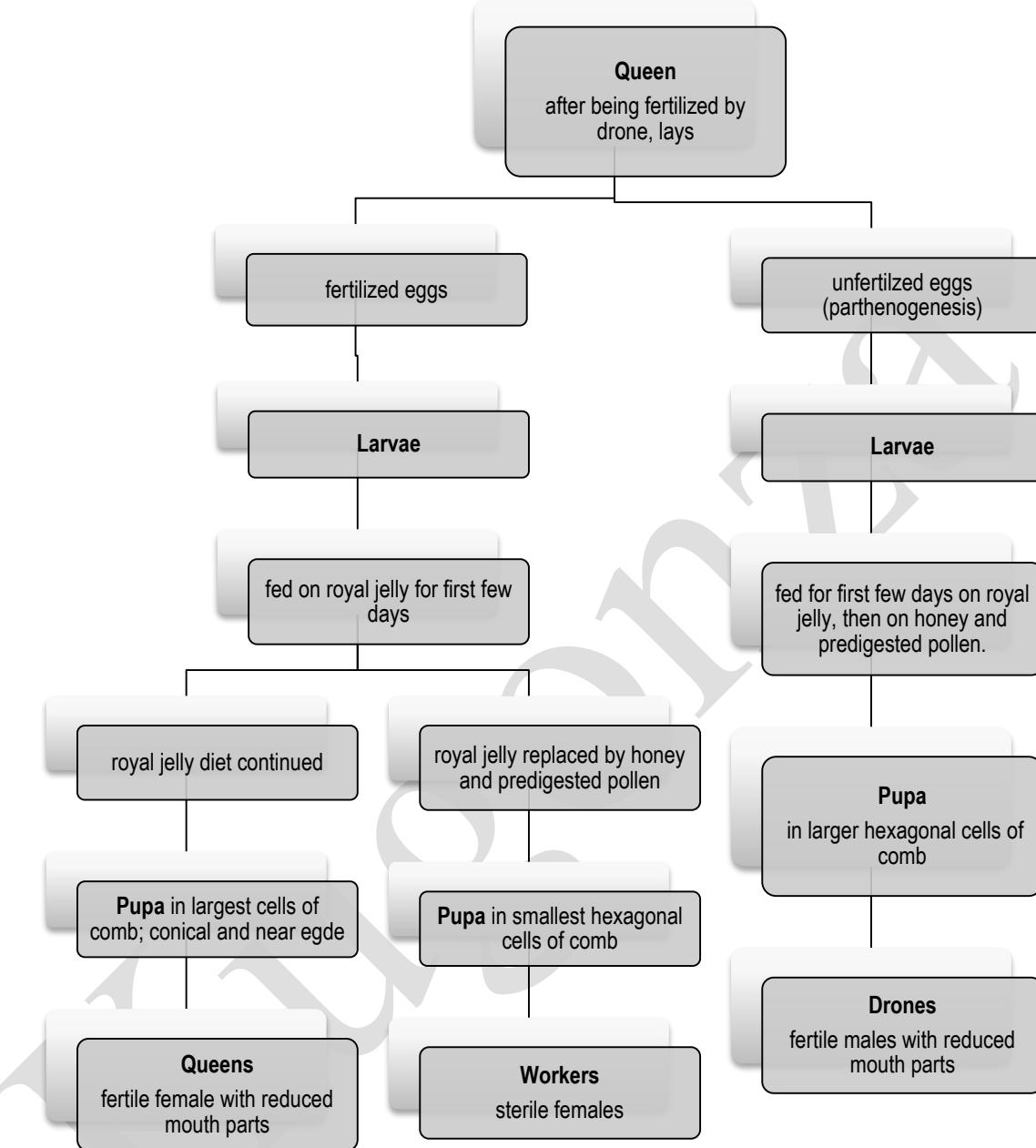
The Drone bee



The Worker bee



### Life cycle of a bee



### Reasons for the successful survival in its habitat

- ✓ Possession of pollen basket on limbs for carrying pollen grains
- ✓ Possession of prongs on their limbs for removing the pollen from the pollen basket
- ✓ Hairy body for trapping pollen grains
- ✓ Mandibles for moulding wax and pollen grains
- ✓ Membranous wings for flight.
- ✓ Spoon like tongue for lapping/sucking
- ✓ Exoskeleton to reduce water loss and protect the body from physical injuries
- ✓ Segmented body for flexibility during movement
- ✓ Tubular expanded proboscis for sucking liquid food
- ✓ Large compound eyes for wide field of view
- ✓ Veins in wings for free circulation of air / strengthening the wings.

**Biological role/importance of bees in the environment**

- ✓ Source of honey which is a rich food (carbohydrate)
- ✓ Pollinate plants most of which provide food for man.
- ✓ Provide wax used in industry to make candles, varnish, shoe polish etc.
- ✓ Their honey is a drug for many diseases like cough.
- ✓ The worker bee-stings inflict irritation on our bodies.

**Revision questions**

1. *Describe the life cycle of a worker bee.*
2. *How are the legs of the honey bee adapted to their role?*

**TERMITES**

Termites are social insects and very many in the topics.

**Classification**

Taxon		Reason
Kingdom	Animalia	They have a mouth for feeding.
Phylum	Arthropoda	It has a hard exoskeleton. It has segmented body. It has jointed legs.
Class	Insecta	It has three pairs of jointed legs. It has three main body parts i.e. head, thorax and abdomen. It has thorax divided into three segments.
Order	Isoptera	

**Habitat:** ant hills

Termites avoid light. When they live their nests/ant hills in search for food, they build covered ways upon the sides of buildings and trees. Inside these tunnels they can carry out their activities protected from the light and the drying effect of the sun.

All termites are vegetarian. A few species feed on grasses, but most feed on wood or dead plant material in the soil.

A termite community consists of different types of castes on insects. These include:

<b>Queen:</b> this lays eggs.	<b>King:</b> this mates with the queen, workers and soldiers. The kings and the queen (reproductives) have wings early in their adult life and go on a nuptial or mating flight.
<b>Workers:</b> these perform all the tasks of the colony, like nest building. They also feed the other members.	<b>Soldiers:</b> these have large heads and jaws/mandibles. They defend the colony against enemies.

**External features of termites**

They have a hard exoskeleton.

They have segmented bodies.

They have three main body divisions

They have smooth bodies.

**The head:**

Soldier termites have broad oblong heads. The other castes have small round heads.

They have biting mouth parts.

They have pointed, hard, sharp and curved mandibles.

They have short, hairy and segmented maxillary palps.

They have hairy and segmented labial palps.

Has a pair short hairy and segmented antennae.

Has a pair of tiny compound eyes except the soldier termite which has no eyes.

**The thorax:**

Has three segments i.e. prothorax, mesothorax and metathorax.

Has three pairs of legs. One pair on each thoracic segment.

The thorax is smooth.

All legs are of the same size.

**The abdomen:**

The abdomen is cylindrical, segmented, elongated and smooth.

**Adaptations / reasons to the habitat:**

- Hairy antennae for increased sensitivity.
- Hard sharp mandibles for cutting solid food and defense.
- Curved/ sharp/pointed claws for movement on rough surfaces.
- Sticky arolium for moving on smooth surface.
- Segmented body for flexibility during movement.
- Body covered with exoskeleton for protection against water loss/ desiccation/ mechanical damage.
- Hairy maxillary palps to increase sensitivity to food.

**Economic importance**

- They help to turn the soil over, and keep it loose and aerated.
- They are source of food.
- They eat dead or living wood, in the process they damage timber including timber used in buildings, young trees and sometimes crops.

**Control measures**

- Use termite resistant paint on timber to be used for construction.
- Use construction materials that can't be attacked by termites like steel.

**THE DICHOTOMOUS KEY**

This is an artificial way of classifying specimens, basing on observable features. It involves dividing the specimens provided into two groups, which are further subdivided into two, until a single specimen remains in a group.

Only features observable and contrasting are the ones used, i.e. avoid using the word 'not' when stating an observable feature.

**Characteristics considered in arthropods**

- Wings i.e. present or absent.
- Number of wings i.e. one or two pairs.
- Number of legs i.e. 6, 8, or more than 8.
- Number of main body parts i.e. 2 or 3.
- Compound eyes i.e. present or absent.
- Antennae i.e. present or absent.
- Abdomen texture i.e. smooth or rough/hairy or non-hairy.
- Antennae shape i.e. pointed or clubbed (knobbed)
- Anal cerci i.e. present or absent.
- Simple eyes i.e. present or absent.
- Note: soldier termites lack both simple and compound eyes.

**Methods of constructing a dichotomous key**

You should use contrasting characteristics in each lead. Before constructing the dichotomous key, a **flow chart** should be made.

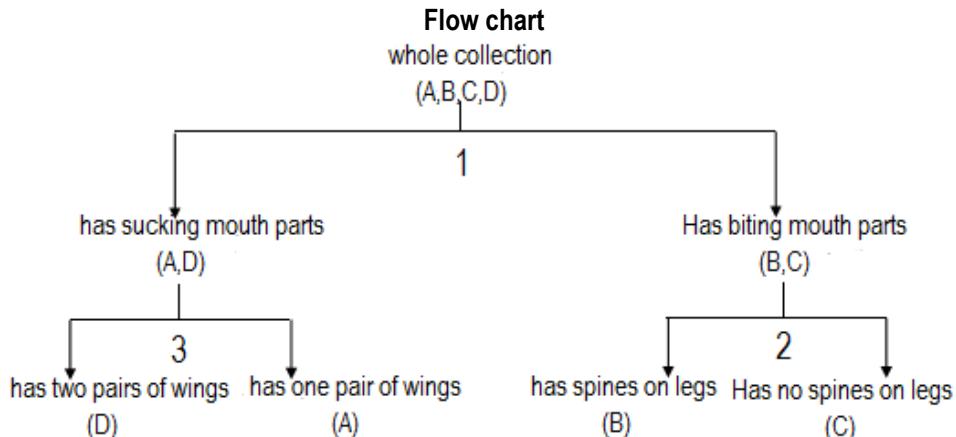
**Consider four specimens:**

Honey bee (A)

Cock roach (B)

Termite (C)

House fly (D)



**The dichotomous key would then be as follows;**

- 1    a) Has sucking mouth parts ..... go to 2  
     b) Has biting mouth parts ..... go to 3
- 2    a) Has two pairs of wings ..... D  
     b) Has one pair of wings ..... A
- 3    a) Has spines on legs ..... B  
     b) Has no spines on legs ..... C

**Activity:**

Provide students with any arthropods (more than 4) to construct a dichotomous key in groups while in class.

**Practical exercise**

You are provided with specimen T. (cock roach)

- a) Observe the specimen and state the class the specimen belongs to. Give two reasons.

Class:

Reasons:

- b) Examine the mouth parts of specimen T using a hand lens and suggest the type of food (solid or fluid) the specimen feeds on giving a reason.

Type of food:

Reason:

Describe two ways how the mouth parts are suited for the type of food eaten by the specimen.

- c) Examine the outer and inner wings of the specimen and describe their structure.

- d) State the function of the wings of T basing on their structure.

- e) How is the structure of the hind limbs related to their functions?

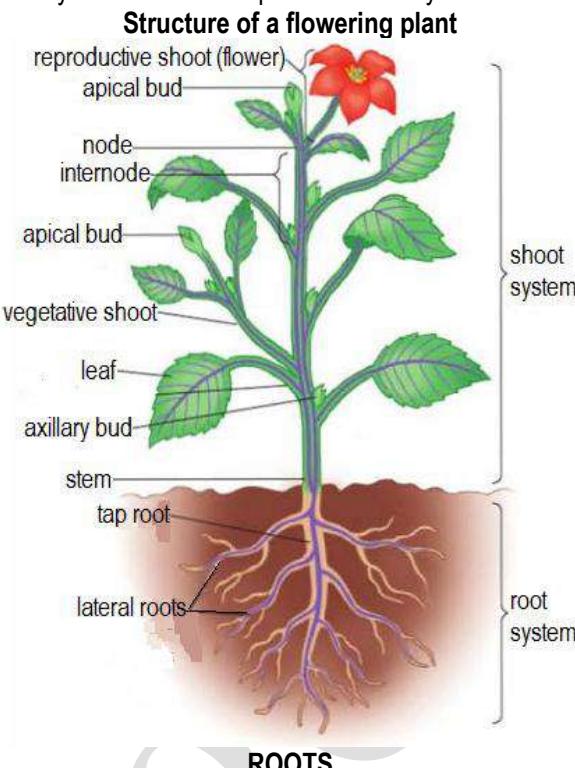
- f) Draw and label the ventral view of the last three abdominal segments.

## FLOWERING PLANTS

These are plants that bear flowers. A typical flowering plant is composed of 2 systems i.e. Root system and Shoot system. The two systems are made up of two categories of organs i.e.

**Reproductive organs:** these produce fruits and seeds. They are directly involved in the reproduction of the plant.

**Vegetative organs:** these are not directly involved in the reproduction. They include roots, stems and leaves.

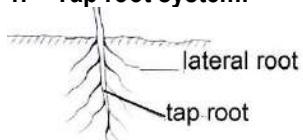


## ROOTS

A root is a descending portion of the axis of the plant and develops from the radical of the embryo during germination.

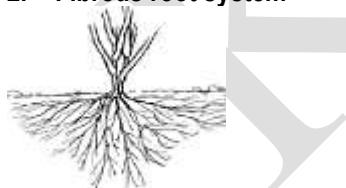
### Types of roots

#### 1. Tap root system:



**This consists of a main root growing straight down wards from the radicle.** It gives rise to side roots called lateral roots. Tap root system is a characteristic of dicotyledonous plants.

#### 2. Fibrous root system



**This is the root system without a main root and all roots arise from the same point of the base of the stem.** The roots are almost of the same size and a characteristic of monocotyledonous plants.

### Functions of roots

- They anchor the plant firmly in the soil.
- They absorb water and mineral salts from the ground to the plant.
- They conduct the absorbed water and mineral salts up to the stems and leaves.
- In some plants, roots are modified into root tubers which store food e.g. cassava.
- Some roots are modified for breathing e.g. white mangrove.

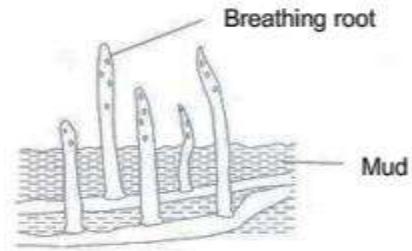
## MODIFIED ROOTS

### 1. Storage roots

These are thick fleshy and succulent roots. **They contain stored food like sugar and starch. The roots are modified as root tubers e.g. carrots, cassava and sweet potato roots.**

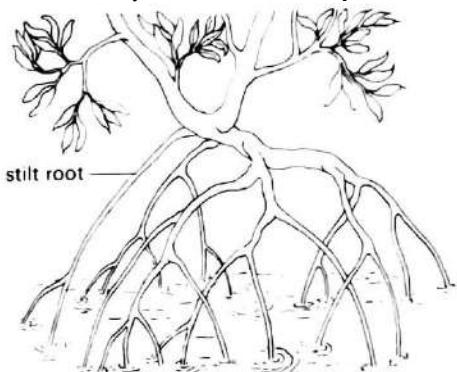
## 2. Breathing roots

These are found on some plants growing in swampy areas e.g. **white mangrove**. Its roots grow up through the mud to the air. The root parts above the mud are spongy and absorb air from the atmosphere. The main root of such plants bears branch roots.



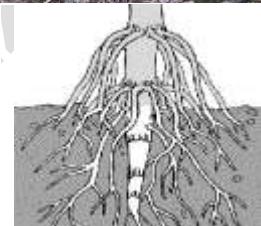
## 3. Stilt roots

These roots develop from the main stem in certain plants such as **red mangrove** which grow in muddy areas. **Stilt roots provide additional support to the plant.**



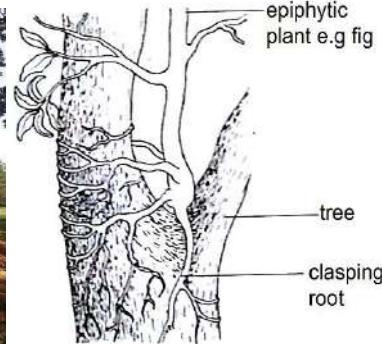
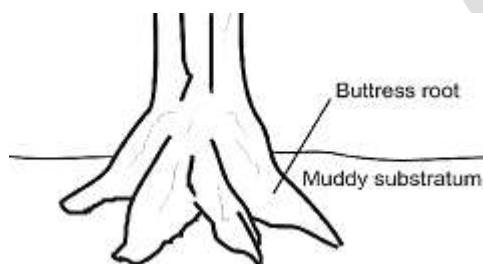
## 4. Prop roots:

These are found growing on plants such as **maize, sorghum and sugar canes**. They develop from the nodes of the stem close to the soil surface. **They provide extra support by holding the plant firmly to the soil surface.**



## 5. Buttress roots

These are large thick roots growing from the base of certain stems e.g. **Mvule trees, silk cotton**, etc. **They provide extra support to the plant by anchoring it firmly in the soil.**



## 6. Clasping roots

These are roots growing from the nodes of climbing stems such as **figs (mituba trees), vanilla and orchids**. They secrete a sticky substance which dries up in air. **These helps such plants cling on to other plants for support.**

## 7. Epiphytic roots

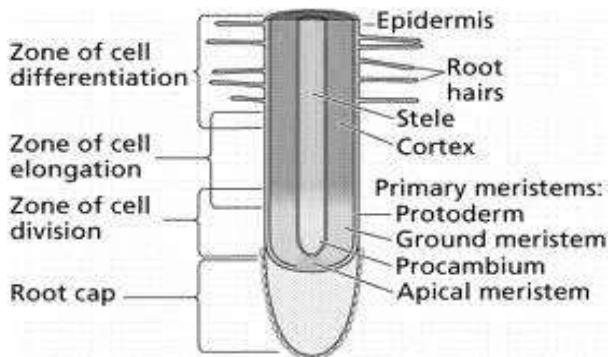
These grow on certain plants called epiphytes. Epiphytes are plants which grow and get support from other plants. These roots hang freely in the atmosphere. **They absorb moisture from the atmosphere.**



## 8. Sucking roots

These are roots found growing on certain parasitic plants e.g. **figs (mituba)**. They grow from the stem and penetrate the host plant. **These roots absorb water, mineral salts and organic food compounds from the host plant.**

### INTERNAL STRUCTURE OF A ROOT (LONGITUDINAL SECTION)



In a longitudinal section through the growing end of a root, its parts are divided into 4 main zone or regions:

- 1) Root cap
- 2) Region of cell division (meristematic region)
- 3) Region of cell elongation
- 4) Region of cell differentiation (maturation)

#### 1) Root cap

**This is found at the tip of the root** and is made up of loosely arranged cells. It protects the tender apex of a root from mechanical damage as it makes its way through the soil. It's absent in aquatic plants.

#### 2) Region of cell division

This is the growing apex of the root lying just behind the root cap. The **cells in this region undergo repeated divisions** to form new root cap and new cells that increase the length of the root.

#### 3) Region of cell elongation

This is the region lying just above the region of cell division. The cells in this region absorb water and develop vacuoles, the cells being elastic, elongated and enlarged. This causes an overall growth in the length of the root.

#### 4) Region of cell differentiation

This is also called the region of absorption. The characteristic feature of this region is the development of root hairs. The cells in this region acquire specific shapes and functions thus they are said to be differentiated or specialized.

**NB:** the region behind the zone of differentiation is the oldest part of the root. It has permanent tissues and is covered by a layer of cork which prevents the evaporation of water from the roots.

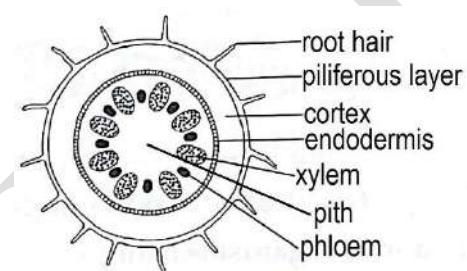
### Transverse section of a root

The transverse or cross section of most young roots has two regions

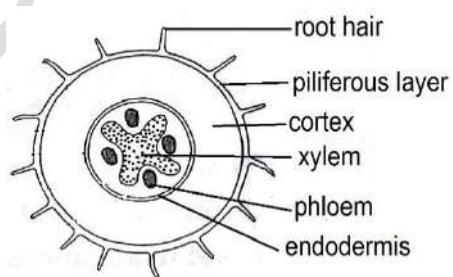
- The outer cylinder (cortex)
- The central cylinder (stele)

The vascular tissues are composed of xylem and phloem and may contain cambium and pith tissues.

#### Monocot root



#### Dicot root



### Functions of the parts

**Root hairs:** absorb water and mineral salts from the soil.

**Piliferous layer:** protects the cortex cells from mechanical damage. It also prevents loss of water from the cortex cells since it is impermeable to water.

**Cortex:** contains cells that provides mechanical strength to the root.

**Xylem** is the water conducting tissue through which water and mineral salts pass from the soil upwards to the stem and leaves.

**Phloem** is the food conducting tissue that carries manufactured food from the upper parts of the plant mainly leaves and distributes it to various parts of the root.

**Cambium:** causes secondary thickening of the root. It adds all secondary xylem cells on its inner side and secondary phloem cells on its outer side by continuous cell division during growing season.

**Pith:** is a small area in the centre of the monocot root. It is composed of parenchyma cells for strengthening the root. It's normally absent in most roots. It also stores food and water for the plant.

**Differences between transverse section of monocot and dicot roots**

Dicot root	Monocot
Has no pith.	Has pith.
Can form a ring of cambium.	Cannot form a ring of cambium.
The xylem is star-shaped occupying the central part.	The xylem and phloem alternates forming a ring.

**STEMS**

This is the ascending portion of the plant axis that develops from the plumule of the embryo. It has the following characteristic features;

- i) It bears leaves at the nodes.
- ii) It has nodes and internodes.
- iii) It has buds in the axill called axillary buds.
- iv) It has flowers or fruits.
- v) Its terminal bud is located at the tip of the stem.

**NB:** the axill is the angle between the leaf and the stem.

**Functions of stems****a) Primary functions**

- i) They hold leaves in the best position for receiving enough sun light needed in the process of photosynthesis.
- ii) They conduct water and mineral salts from roots to leaves and manufactured food from leaves to other parts.
- iii) They hold flowers and fruits in good position so that they can be easily pollinated or dispersed.
- iv) When stems are young, they carry out photosynthesis thus making food for the plant.
- v) Stems have lenticels (pores) that facilitate gaseous exchange.

**b) Secondary functions**

- i) Some stems may specialize in storing food and water e.g. stem tubers like corms, Irish potatoes, rhizomes and sugar cane.
- ii) Protect a plant against browsers by forming thorns, spines or prickles.
- iii) Vegetative reproduction or propagation through the stem cuttings e.g. cassava and sweet potatoes.
- iv) They support the plant by climbing stem tendrils e.g. *pasum pea* (wild pea).

**TYPES OF STEMS****1) Erect stems**

These can support themselves in an upright position. They may be woody or herbaceous.

**Woody stems:** These have a high content of lignin and are hard. They are found in shrubs and trees.

**Herbaceous stems:** These contain no or less woody materials e.g. tomatoes, rice. The herbs are shorter than grass.

**2) Weak stems**

These can't support themselves upright but either creep or climb for support.

**3) Underground stems**

These are modified stems which remain permanently underground. They are often swollen and serve as food storage organs.

**NB:**

- Annual herbs only live for one year
- Bi-annual herbs live for two years
- Perennial herbs live for many years

**MODIFICATION OF STEMS****Weak stems****1. Twinning stems (twinners)**

These are stems that grow ascending spirally around a support. They are usually long and slender e.g. Dutch man's pipe and lianas.



## 2. Climbing stems

These are stems that grow clinging to the support of other plants by means of **tendrils**. Tendrils are thin wire-like spirally coiled branches of certain stems. They may be modified at axillary buds e.g. in passion fruit plants or terminal buds.



## 3. Creeping stems (creepers)

These are long thin stems which grow along the surface of the ground, giving off roots at certain intervals of the nodes.

**Types of creeping stems are;**

### i) Runner



This is a slender trailing stem lying flat on the ground possessing long internodes. A runner arises as an axillary bud and creeps some distance away from the mother plant and grow into another plant e.g. **oxalis**.

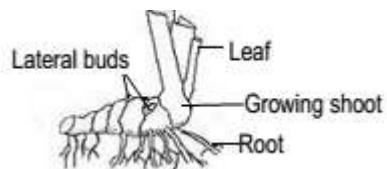
### ii) Offset stems



This is a horizontal thickened short stem. It originates from the axil of the leaf and grows flat on the ground. It produces many leaves above and a cluster of roots below e.g. water hyacinth and **water lettuce**.

### iii) Sucker

A sucker is a creeping stem that grows obliquely upwards, directly giving rise to a leafy shoot. E.g. **banana**, pineapple, sisal plant, etc.



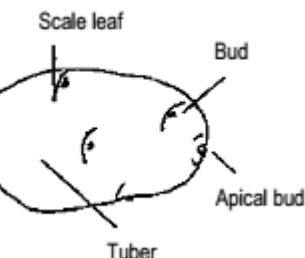
## Underground stems

There are four types of underground stems namely: Rhizome, Corm, Stem tuber and Bulb.

### 1. Rhizomes

This is a horizontal thick underground stem having adventitious roots growing from the lower side of the nodes. It has terminal buds which develop into aerial shoots. It bears buds in axils of the reduced brown leaves called scale leaves.

Rhizomes store a lot food for the plant. Some also act as organs for vegetative propagation e.g ginger, canally, couch grass and Solomon's seal.

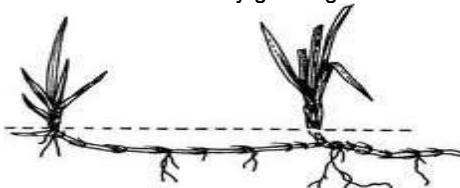


### 2. Stem tuber

This is a short, fleshy underground stem swollen with large amounts of stored food. It has scale leaves and axillary buds which form the 'eyes' e.g. Irish potato, yams.

### 3. Stolon

A stolon is a horizontally growing stem that roots at the nodes and develops buds that grow into new plants. E.g. straw berry.

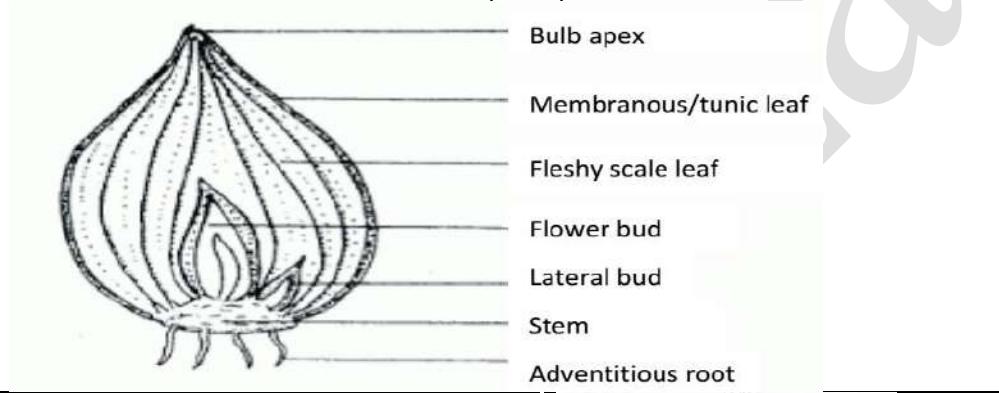


### 4. Bulb

A bulb is short conical-shaped underground stem comprising of thick fleshy leaves arranged in concentric circles. The thick fleshy leaves store food for the plant and are protected by outer dry brown leaves called scale leaves.

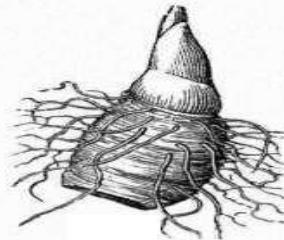
A terminal bud lies at the top of the stem and give rise to the aerial shoot. Axillary buds are situated between the leaf bases. Onions, garlic, tuberose, etc. are bulbs.

**Structure of a bulb (onion)**



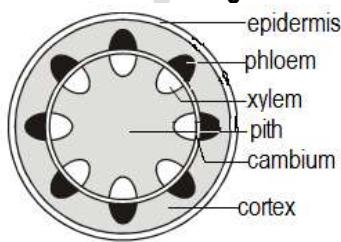
### 5. Corm

A corm is a swollen fleshy underground stem that grows in a vertical direction. It is round-shaped and somehow flattened from the top to bottom. It has a terminal bud lying at the top of the stem and has scale leaves arising from the nodes. Its roots grow randomly from the stem. Examples of corms are coco yams and yams.

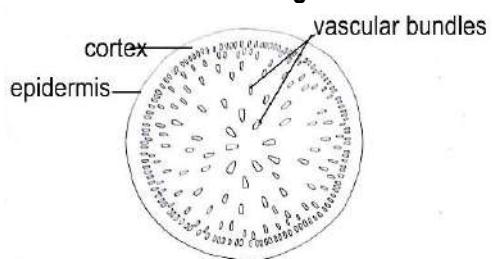


## INTERNAL STRUCTURE OF STEMS

**Transverse section through a dicot stem**



**Transverse section through a monocot stem**



**Internally stems have 3 main tissues:**

#### 1. Epidermis

It comprises of a single layer of cells which are brick-shaped. The outer wall of these cells is thickened by cutin, a waxy material which forms the outside skin of a stem called cuticle.

It protects the stem against water loss. It also protects the inner tissues of the stem from mechanical injury.

It prevents entry of bacteria and germs into stem.

#### 2. Cortex

This is the part of the stem between the epidermis and the vascular bundles. It's made up of collenchyma, parenchyma and endodermis.

i) **Collenchyma:** This is the outer tissue of the cortex. It's 3 or more cells thick. The cells are small and tightly packed. They offer mechanical support, hence strengthening and giving rigidity to the stem.

- ii) **Parenchyma:** This is made up of large thin walled cells. These cells have air spaces between them called intercellular spaces. The spaces provide passage for water vapour and gases in the stem. Parenchyma cells offer support to the stem when filled with water and also store some food.
- iii) **Endodermis:** This is a single layer of rectangular shaped cells. It contains usually starch, and its main function is storage of food.

### 3. Vascular bundles

These are conducting or transporting tissues of a plant. They consist of xylem and phloem. The phloem lies externally and the xylem lies internally in each bundle.

#### Phloem:

The phloem conducts and transports manufactured food. It is made up of three main cells:

- i) **Sieve tubes:** These are cylindrical tubes arranged end to end in long rows. Their cross-walls have many fine pores forming a sieve plate. They conduct manufactured food in the stem.
- ii) **Companion cells:** These are smaller than the sieve tubes. They are filled with a dense cytoplasm and have nucleus. They control the activities of the sieve tubes.
- iii) **Phloem parenchyma:** It stores some food in the stem. They are the first to be formed in the vascular bundle.

#### Xylem:

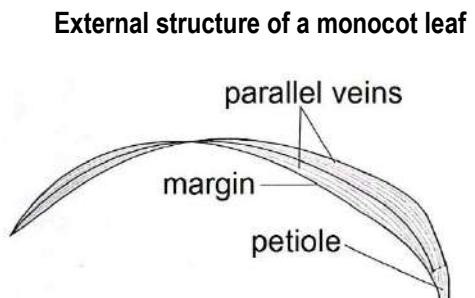
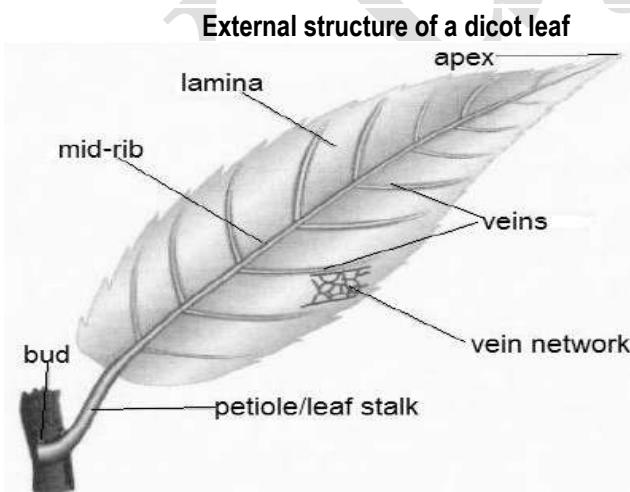
Xylem is water and mineral salts conducting tissue. It comprises of 2 types of cells i.e. vessels and tracheids. These cells have their walls thickened with a substance called lignin. The xylem also provides mechanical strength to the stem due to the presence of lignified dead cells. The lignified dead cells formed between the endodermis and phloem is termed as sclerenchyma.

#### Differences between dicot and monocot stems

Monocot stem	Dicot stem
Lack cambium	Has cambium. The cambium is responsible for secondary growth or thickening of the stem.
The vascular bundles are scattered within the stem.	The vascular bundles are arranged in form of a ring.
Lack a distinct cortex and pith.	Has a distinct cortex and pith. The pith is wide.
Its cortex has several layers of parenchyma cells.	Its cortex has a few layers of parenchyma cells.

## LEAVES

A leaf is a thin flattened structure which grows from the nodes of a stem or its branches and has a bud in its axil. Leaves are generally green although some are red or brown.



Leaves with a petiole are called **petiolate** and those without are called **sessile**.

The **leaf stalk** is a characteristic of dicots while a **leaf sheath** is found in monocots. The leaf stalk/sheath can be hairy or smooth.

**Lamina** is the expanded and flattened portion of the leaf consisting of veins and midrib. The lamina texture may be hairy or smooth. It may be hard or soft.

**Venation:**

The arrangement of veins in the lamina of a leaf is called venation. Two broad types of venation are;

**1. Network venation/reticulate venation**

In network venation, the veins in the lamina branch while intersecting to form a network. It's a characteristic of dicots.

**2. Parallel venation**

In this venation, the veins run side by side without branching. This is a characteristic of monocotyledonous plants.

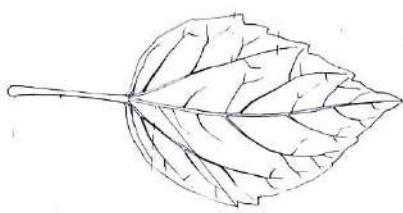
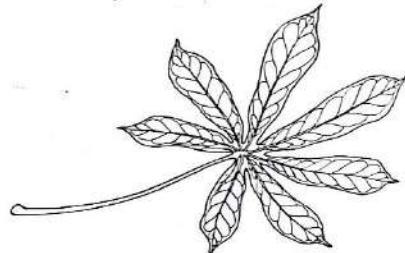
**Leaf complexity**

Leaves can be classified according to whether the leaf lamina is completely divided or not divided. Two broad types are:

**Simple leaves** and **Compound leaves**.

**1. Simple leaves**

A simple leaf has a single lamina which isn't divided up into leaflets e.g. Avocado, mango, orange, hibiscus, pawpaw, cassava, etc. Cassava and pawpaw leaves are partly divided. The lobes are not considered to be leaflets because the divisions do not reach down the midrib. They are simple digitate i.e.

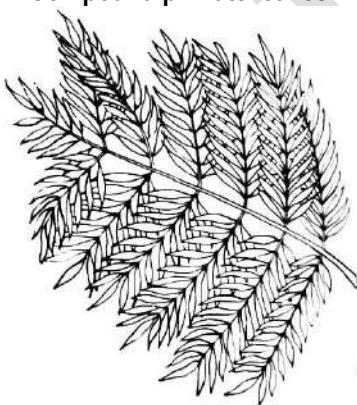
**Simple leaf****Simple digitate leaf of cassava**

A swelling at the base of the leaf stalk is called **pulvinus** e.g. beans and cassava. Some leaves have it while others do not have it.

**2. Compound leaves**

A compound leaf has a lamina which is completely divided into leaflets.

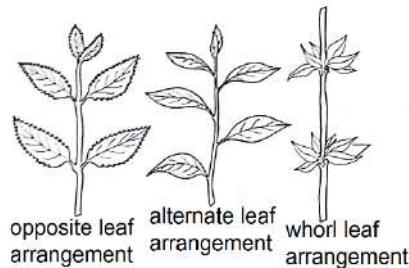
They resemble leaves but are not leaves because the axillary buds are absent in the axis of leaflets e.g. beans, oxalis, cassia, etc.

**Types of compound leaves****Compound pinnate leaves****Compound bipinnate leaves****Compound digitate leaves****Compound trifoliate leaves**

**NB:** stipules (foliar appendages) are attached to the leaf base or petiole e.g. in beans, hibiscus and cassia.

### Arrangement of leaves on a stem

Leaf arrangement is the insertion of leaves on the stem. Leaves develop at the nodes in the stem and are arranged in different ways.

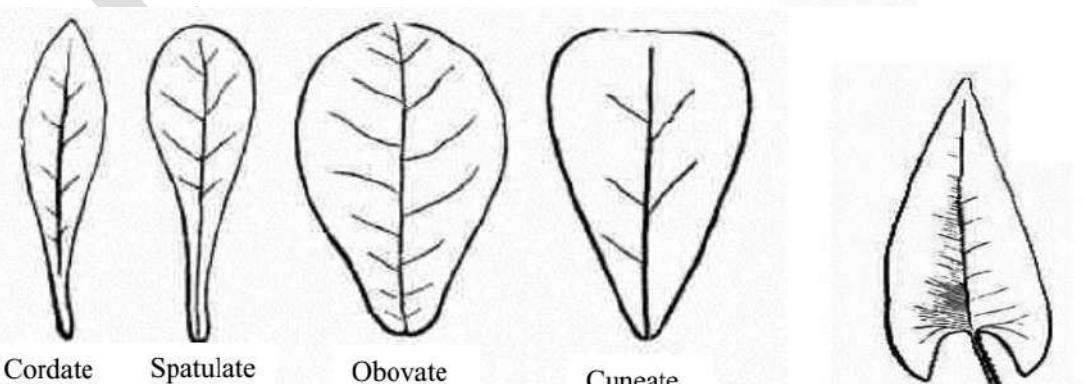
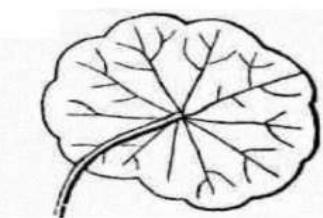
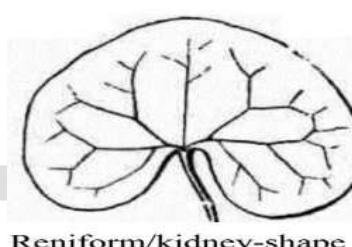
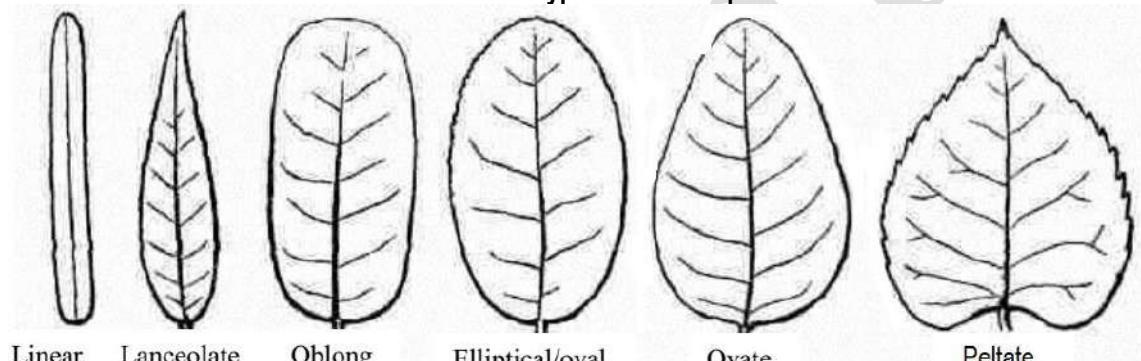


### Types of leaf margins

Leaves can be classified according to the leaf margins.

1. **Entire margin:** The margin is smooth and without indentation of any kind. E.g. mango leaves.
2. **Serrate margin:** The margin is with indentations pointing towards the apex.
3. **Crenate margin:** The margin has round indentations.
4. **Dentate margin:** The margin has indentations pointing towards the petiole.
5. **Lobed margin:** The margin has relatively few and shallow indentations.

### Types of leaf shapes



Sagittate/arrow-shaped

**Assignment:**

You are provided with specimens **P, Q, R, S and T**, which are plant organs of various plants.

- Examine each specimen carefully and then using only external morphological features, construct a dichotomous key which can be used to identify them. (**Leaves of beans, hibiscus, sweet potato, maize and mango**)
- Which specimens, with reasons, are from
  - Monocotyledonous plants**
  - Dicotyledonous plants**

**Functions of leaves to plants****Primary functions:**

- The major function is to manufacture food for the plant during photosynthesis.
- Leaves have stomata which allow exchange of gases i.e. O<sub>2</sub> and CO<sub>2</sub>.
- Leaves facilitate transpiration which sometimes helps the removal of excess water within the plant.

**Modification of leaves**

Leaves of some plants have become modified to perform other functions other than photosynthesis.

**1. Leaf tendrils**

These are slender wire like coil structures used as climbing organs in climbers for support. The leaf may be partly modified into a tendril.

**2. Scale leaves**

These are thin, dry membranous structures usually brown in colour and sometimes colourless.

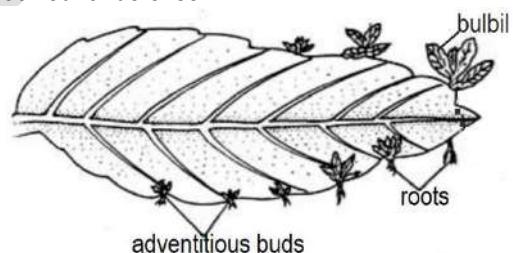
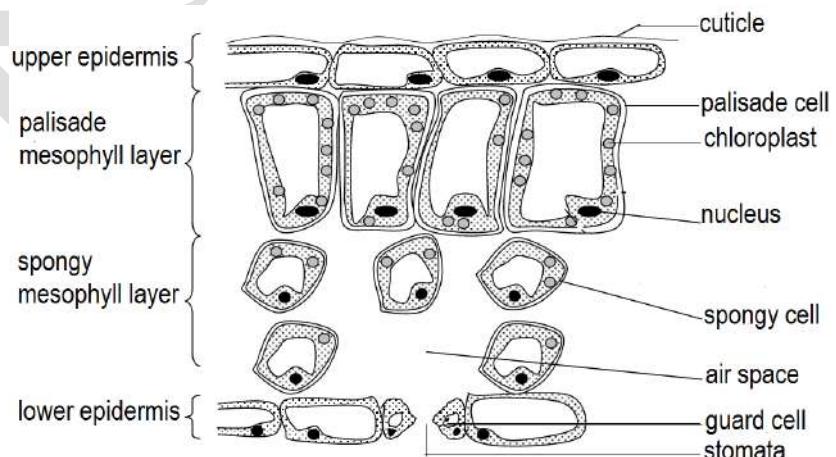
Their main function is to protect the axillary bud from mechanical injury and drying out. They are commonly found on underground stems. E.g. scale leaves of onions, rhizome and garlic.

**3. Insectivorous leaves**

These are modified leaves whose function is to capture and digest insects. Such plants are called insectivorous plants. Pitcher plants grow in soil with a deficiency of nitrogen/nitrates. They obtain nitrogen from insects. E.g. Venus fly trap, butter wort, sundew, bladder wort, etc.

**4. Leaf spines:** These are sharp pointed structures of certain plants modified for defense.**5. Bryophyllum leaves**

These leaves are thick and succulent. They have series of buds at the end of veins. These buds grow into new plants (plantlet) called bulbils when the leaf is mature.

**INTERNAL STRUCTURE OF A LEAF****1. Epidermis:**

This is the outer most layer of a leaf. It's covered by a transparent water porous layer of cutin called cuticle. This cuticle allows light penetration into the leaf and prevents excess moisture loss from the leaf surface. The cuticle also protects the

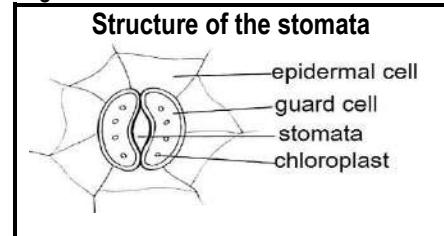
plant from disease-causing organisms and mechanical injury. The epidermal tissue is divided into 2, i.e. upper and lower epidermis.

The major function of this epidermis is to prevent evaporation of water from the leaf cells and protection of the inner cells. The lower epidermis is usually made up of one layer of cells and contains numerous openings called **stomata**.

### Stomata:

These are small openings found in the epidermis of a leaf. They are surrounded by 2 guard cells. Plants growing on land have more stomata located in the lower epidermis than in the upper epidermis. (The reverse is true for aquatic plants). The function of the stomata is to allow entry and exit of important gases like O<sub>2</sub> and CO<sub>2</sub> into the leaf.

The stomata also regulate the loss of water vapour from the plant i.e. they control transpiration.



## 2. Mesophyll:

This is located between the upper and the lower epidermis. It's differentiated into two layers. i.e.

### i) Palisade mesophyll layer

It's found just below the upper epidermis. It's made up of cylindrical shaped cells. The cells are closely packed together with numerous chloroplasts.

The chlorophyll absorbs maximum sun light for photosynthesis.

### ii) Spongy mesophyll layer

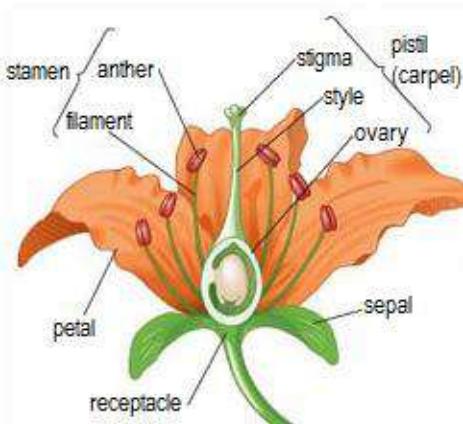
It's found under the palisade layer. It consists of cells called spongy cells which are irregularly arranged. These cells are not closely arranged, and therefore have large intercellular air spaces for gaseous exchange. Spongy cells contain fewer chloroplasts than the palisade cells hence they also carry out photosynthesis.

## 3. Vascular tissue

These are vascular bundles consisting of veins. Each vein has a phloem for transporting manufactured food and the xylem for conducting and distributing water and mineral salts. The veins also provide mechanical support to the leaf lamina.

## THE FLOWER

### General structure of a flower



The flower is part of the shoot specialized for reproduction. Most flowers have male and female reproductive organs though some are of a single sex. A group of flowers on a single stalk is called an **inflorescence** e.g. maize flower.

### Parts of a flower

The floral parts are arranged in rings, spirals or whorls with short internodes. The end of a flower stalk may be expanded to form a receptacle. The stalk of the flower where floral parts grow is called pedicel.

The four floral whorls are **Calyx, Corolla, Gynoecium and Androecium**.

**The calyx** is the outer most floral whorl of the flower made up of sepals. The calyx protects the inner whorls of a flower during the budding stage.

**The corolla** is the second floral whorl of a flower made up of petals.

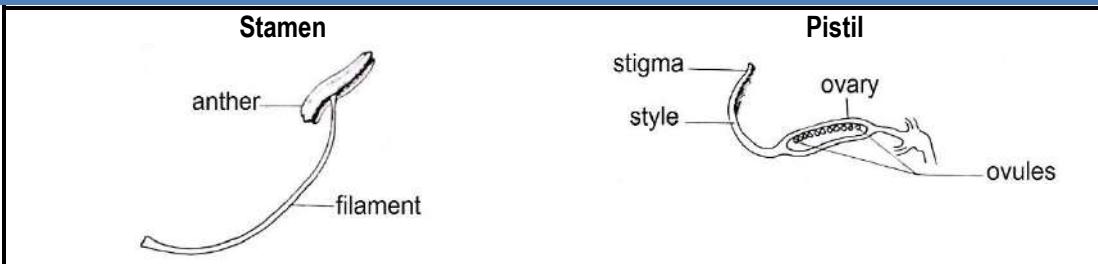
Most flowers have scented petals. The calyx and corolla are collectively known as **Perianth**.

**Androecium** is the male part of the flower consisting of **stamen**. Each stamen is made up of filament and head called anther. Anthers contain pollen grains which develop to form male reproductive cells called gametes.

N.B: an infertile or sterile stamen is called **staminode**.

**Gynoecium (pistil)** is made up of female reproductive parts called **carpels**. The pistil occupies a central position in the flower. Each carpel is made up of;

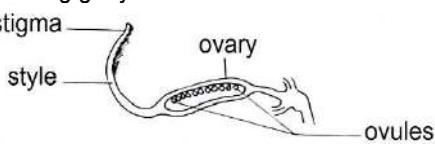
- ✓ **Ovary** which contains ovules or female gametes. The wall of the ovary develops into the pericarp of the fruit. At the base of the ovary on the receptacle is a **nectary** which produce a sugary solution called **nectar**.
- ✓ **Style** which connects the ovary to the stigma
- ✓ **Stigma** which receives the pollen grains



Three main types of pistils are:

**1. Monocarpous:**

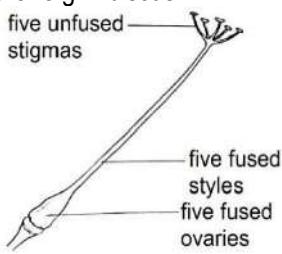
This is a pistil with only one carpel e.g. morning glory and crotalaria.



**Types of pistils**

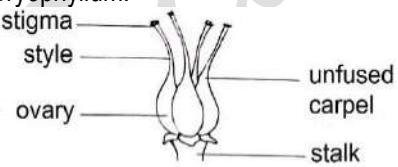
**2. Syncarpous pistil:**

This is a pistil with carpels fused together e.g. hibiscus.



**3. Apocarpous pistil:**

This is a pistil with several carpels which are not fused i.e. as distinct carpels e.g. butter cap and Bryophyllum.



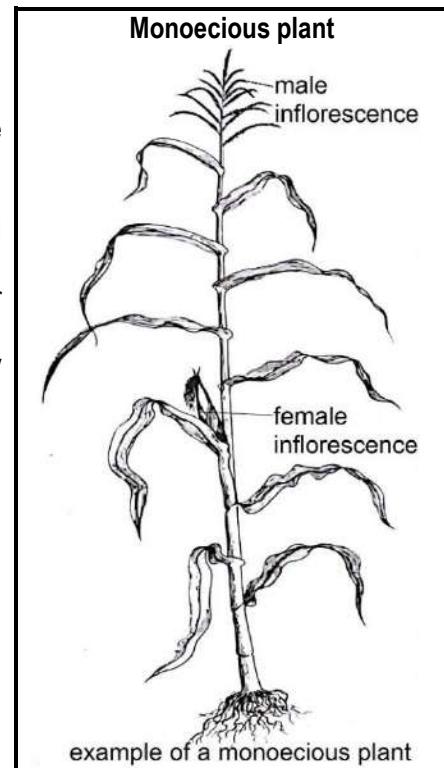
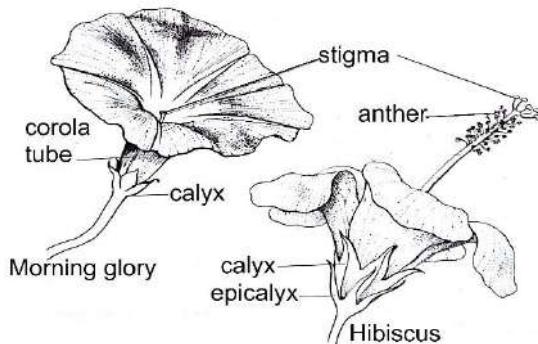
**Types of ovaries**

The two types of ovaries include the following

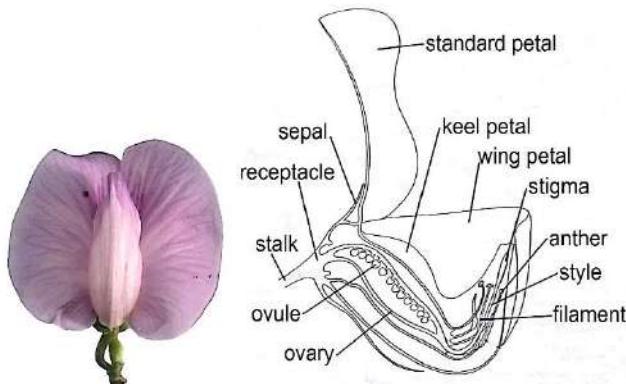
1. **Superior ovary:** Is the one that arises above the other floral parts e.g. hibiscus, cassia, mimosa pudica, etc.
2. **Inferior ovary:** Is the one which arises below the rest of the floral parts e.g. morning glory.

**Terms used**

- 1) **Complete flower:** A flower having all the four whorls or floral parts i.e. calyx, corolla, stamen and pistil.
- 2) **Incomplete flower:** A flower lacking one or more of the four floral parts.
- 3) **Unisexual flower:** Has only one of the sexual parts i.e. staminate (when the flower has stamens only). Pistillate (when it has carpels only).
- 4) **Staminode:** sterile stamen.
- 5) **Petaloid:** Sepals resembling petals and have the same colour.
- 6) **Sepaloid:** They are petals which resemble sepals and are green in colour.
- 7) **Bisexual (hermaphrodite) flower:** is one that contains both male and female organs and parts.
- 8) **Monoecious plant:** Is one that has the pistillate and staminate that are born on the **same plant** but at different points on the plant e.g. maize and castor oil plants.
- 9) **Dioecious plant:** is a plant that bears only one form of flower .i.e either pistillate or staminate flower only e.g. pawpaw.
- 10) **Regular (actinomorphic) flower:** a flower which can be divided symmetrically (equally) in different planes. E.g. hibiscus and morning glory flowers.



11) **Irregular (zygomorphic) flower:** is one which can be divided into 2 similar halves in only one plane. E.g. crotalaria



## POLLINATION

Pollination is the transfer of pollen grains from the anther to the stigma of a flower. There are two types of pollination.

1. **Self-pollination.** This is the transfer of pollen grains from the anther to the stigma of the same flower or between two flowers on the same plant.
2. **Cross-pollination.** This is the transfer of pollen grains from the anthers of one flower to the stigma of another flower on a different plant but of the same species.

### Agents of pollination

These are things that aid the process of pollination. The agents of pollination include.

Animals, Water, Wind and Artificial pollination

There are however two major agents that is wind and insects. Pollination can therefore be described as wind pollination and insect pollination.

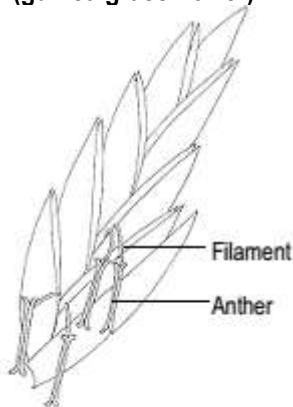
### Characteristics of insect pollinated flowers

- They have brightly coloured petals to attract insects.
- They have a scent to attract insects
- They have large conspicuous petals, which act as landing sites for insects.
- They have sticky pollen grains, which stick to the insects' body.
- They have sticky stigmas, which hold pollen grains.
- They produce few sticky pollen grains.
- They produce heavy pollen grains.
- They produce nectar from nectaries to attract insects.

### Characteristics of wind pollinated flowers.

- They have dull coloured petals.
- They have small petals.
- They produce light pollen grains, which can easily be carried by wind.
- They do not produce nectar.
- They have feathery stigmas to trap pollen grains carried by wind.
- They produce big quantities of pollen grains.
- They have no scent.
- They have long stamens and pistils hanging outside the petals to release and receive respectively pollen grains easily.

Drawing of a wind pollinated flower  
(guinea grass flower)



Long stamen hanging out side

### Differences between insect and wind pollinated flowers.

Insect pollinated flower	Wind pollinated flower
Have brightly coloured petals	Have dull coloured petals
Have a scent	Have no scent
Produce nectar from nectaries	Produce no nectar

Have large petals	Have small petals
Produce few pollen grains	Produce a lot of pollen grains
Have sticky stigmas	Have feathery stigmas
Produce heavy pollen grains	Produce light pollen grains
Stigmas often deep in corolla	Stigmas long and protrude above petals.
Stamens may be within corolla	Stamens long and protrude above petals

### Characteristics of flowers pollinated by nocturnal insects

Nocturnal insects are those insects, which are active at night. Flowers pollinated by such insects have the following characteristics.

1. They have light coloured petals mainly white and pink.
2. They produce a strong scent.
3. They open their petals at night and close them during daytime.

### Modifications of flowers to prevent self-pollination

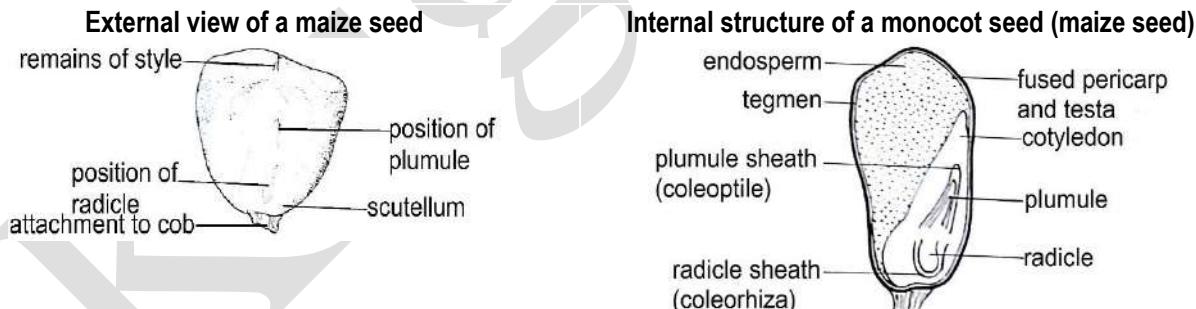
1. **Dichogamy:** Is a condition in which the male and female parts of a flower mature at different times. There are 2 types;
  - Protandry: This is a situation where stamens ripen before the stigma such that when pollination occurs, the pollen grains cannot germinate on the immature stigma.
  - Protogyny: This is a condition where the stigma ripens before the anthers.
2. **Dioecious condition.** This is a condition where a plant bears either pistillate or staminate flowers but not both.
3. **Self-incompatibility.** This is where pollen grains from the same flower fail to fertilize the stigma of that flower.
4. **Structure of the flower.** Sometimes the carpel is taller than the stamens of the same flower and in some flowers the corolla covers the stamens preventing self-pollination.

## SEEDS

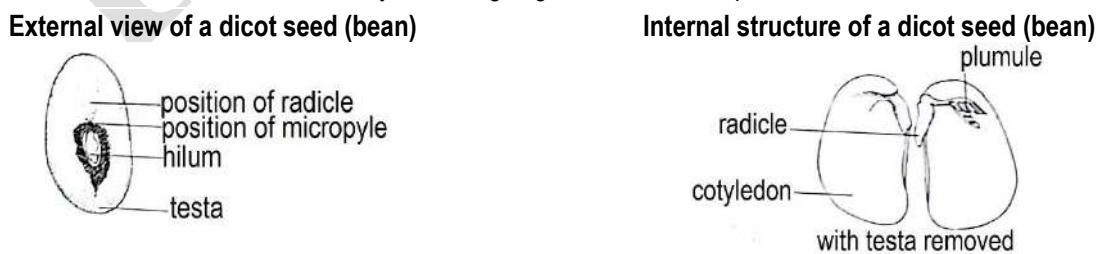
A seed is a fertilized mature ovule. It has one scar called hilum which is a spot where it was attached to the pod inside a fruit.

### Types of seeds

1. **Monocotyledonous seeds:** These contain only one seed leaf or cotyledon. E.g. cereals like maize.



2. **Dicotyledonous seeds:** These contain 2 cotyledons e.g. legumes like beans, peas and G. nuts.



**Testa:** It protects the inner parts of the seed from mechanical injury, heat from the environment and from fungal and bacterial attack.

**Tegmen:** It is the inner membrane of the seed coat and it's also used for protection.

**Micropyle:** It is a narrow opening into the seed through which water, mineral salts and oxygen enter during germination. It is also the opening through which the radicle comes out of the seed.

**Radicle:** It develops into primary root of the plant.

**Plumule:** it develops into the shoot of a plant.

**Hilum:** It's a scar of attachment left by the seed to the fruit wall. *It is the feature that distinguishes seeds from fruits.*

**Endosperm:** Stores food especially starch for the embryo.

**Scutellum or cotyledon:** It provides food to the whole seed. It contains stored food like starch, proteins and liquids for the initial growth of the embryo during germination.

**Coleorhiza:** It is the radicle sheath that offers protection to the radicle.

**Coleoptile:** It is the plumule sheath that offers protection to the plumule.

#### **Adaptations of the seed**

Has a hard seed coat for protection against chemical injury, bacterial and fungal infection.

Has food reserves used by the embryo during drought.

Has a micropyle to allow in water and air.

**Note:** the maize grain is both a seed and a fruit. It's a fruit because it has two scars, i.e. the remains of the style and remains of the stalk.

## **FRUITS**

A fruit is a fully grown fertilized ovary containing one or more seeds. A fruit has 2 scars, one where it was attached to the receptacle and the other, the remains of the style or stigma.

During a fruit formation, the wall of the ovary becomes a fruit wall called pericarp. In some fruits such as banana and pine apple, the fruits develop without fertilization. Such fruit are said to be **parthenocarpic** fruits. Therefore **parthenocarpy is the development of fruits without fertilization.**

#### **Classes of fruits**

**True fruits:** develop only from the ovaries of a flower e.g. beans, tomatoes, etc.

**False fruits:** develop from the association of ovaries and other floral parts such as receptacle. Examples include; pineapples and apples.

#### **Classification of fruits**

There are 3 groups of fruits namely;

##### i) **Simple fruits**

These are formed from one flower in which the pistil consists of either one carpel (monocarpic) or of several fused together (syncarpous) e.g. legumes, ground nuts, peas, tomatoes, mango, beans, etc.

##### ii) **Aggregate fruits**

These are formed from one flower in which the pistil consists of several free carpels (apocarpous) e.g. apples and rose.

##### iii) **Multiple fruits**

These are formed from several flowers and the ovaries become fused after fertilization e.g. jackfruit and pineapple.

## **SIMPLE FRUITS**

There are either dry or succulent according to whether the pericarp becomes dry or juicy as the fruit ripens.

#### **Types of simple fruits**

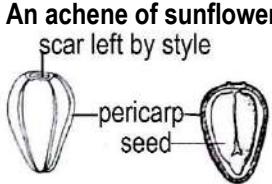
Simple fruits are further divided into three categories.

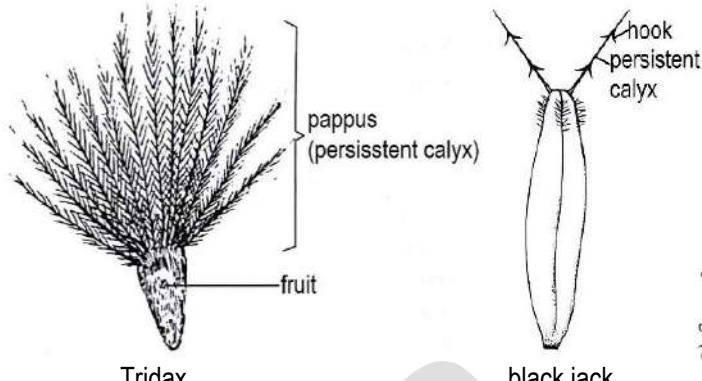
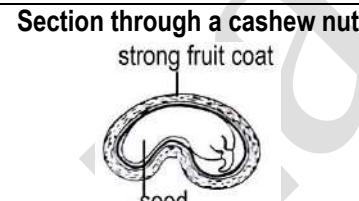
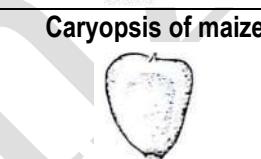
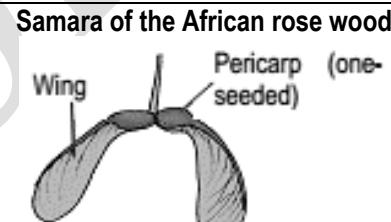
1. Dry indehiscent fruits
2. Dry dehiscent fruits
3. Succulent fruits.

#### **Dry indehiscent fruits**

These are fruits with a dry pericarp that does not split up (dehisce) to release seeds. This category contains five types of fruits. These are Achene, Nut, Caryopsis, Cypsela and Samara.

**The table below shows the different types of dry indehiscent fruits.**

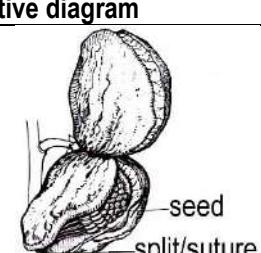
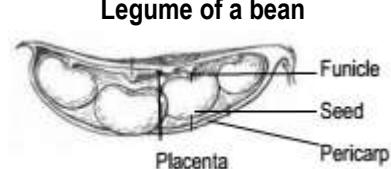
Type of dry indehiscent fruit	Description	Illustrative diagram
Achene	This is a one seeded fruit covered by a dry pericarp, which does not split open, e.g. sunflower	

Cypsela	They have a persistent calyx which forms a parachute of hairs called a pappus. E.g. Tridax and black jack.	
Nut.	It has one seed and has a dry hard and tough pericarp which does not split open, e.g. cashew nut. Note: coconuts and groundnuts are biologically not nuts.	
Caryopsis.	The testa and pericarp are fused together. These are mainly in grasses and maize.	
Samara.	The pericarp is extended to form one or more wing-like structures, e.g. African rose wood.	

### Dry dehiscent fruits

These are fruits with a dry pericarp that splits (dehisces) to release seeds. The fruits split at particular lines of weakness known as sutures. These fruits are categorized into the following different groups depending on the number of splits that occur on the pericarp. These fruits include, Follicles, Legume, Capsule and Schizocarp.

The table below shows the different types of dry dehiscent fruits

Type of dehiscent fruit	Description	Illustrative diagram
Follicle	This is a dry fruit with many seeds and splits open along one suture, e.g. Sodom apple	
Legume.	This is a dry fruit with many seeds and splits open along two sutures, e.g. beans, peas, flamboyant, jacaranda fruit and Barbados pride.	

<b>Capsule</b>	This is a dry fruit with many seeds and splits open along many vertical slits. It is formed from an apocarpous flower, e.g. Dutchman's pipe, balsam, cotton, etc.	
<b>Schizocarp.</b>	This is a dry fruit that splits into single-seeded parts (loments) when ripe. e.g. desmodium, sweet hearts and some cassia.	

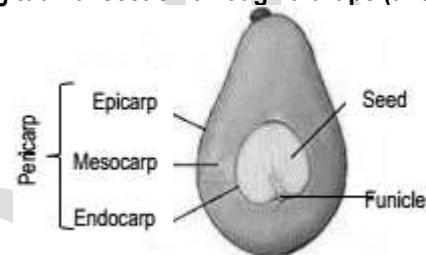
### Succulent fruits

These are fleshy fruits. They are either entirely fleshy or have part of it fleshy. They are further divided into 2 types.

#### 1. Drupes.

These are fruits with only one seed and only part of it fleshy (epicarp and mesocarp). The endocarp is fibrous and hard, e.g. mango and avocado.

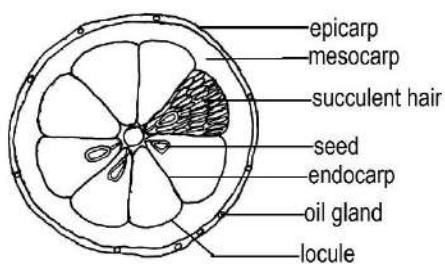
#### Longitudinal section through a drupe (avocado)



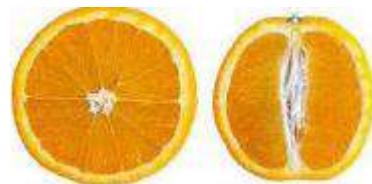
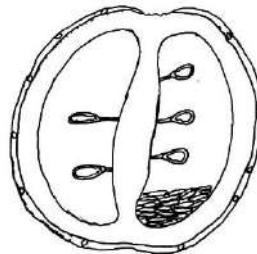
#### 2. Berry.

This is a fruit with many seeds and the whole of it fleshy, e.g. tomatoes, guavas, oranges, bananas etc.

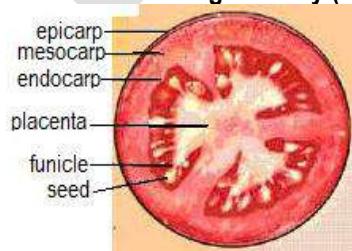
A drawing of the transverse section through a berry (orange)



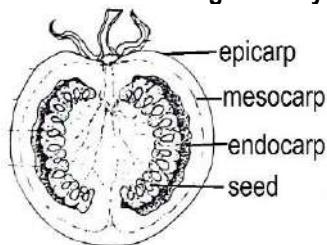
A drawing of the longitudinal section through a berry (orange)



Transverse section through a berry (tomato)

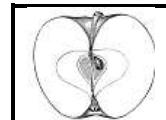


Longitudinal section through a berry (tomato)



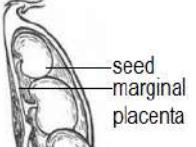
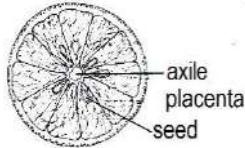
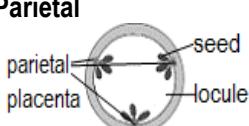
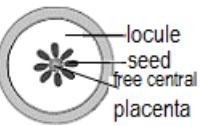
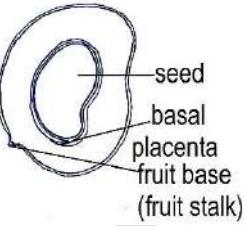
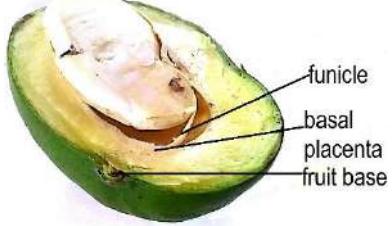
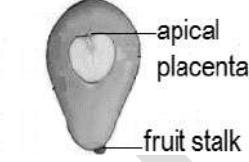
#### 3. Pome

This is a succulent fruit in which the outer fleshy (normally edible) part develops from the calyx and receptacle. The ovary forms a papery cover containing seeds e.g. apple and pears.



## PLACENTATION

Placentation refers to the pattern of seed attachment in the fruit. There are six types of placentation i.e. marginal, axile, free central, parietal, basal and apical placentation as shown in the table below.

Type of Placentation	Description	Example
<b>1. Marginal</b>  seed marginal placenta	The seeds are attached along the margin of the fruit wall.	Beans, peas, cassia 
<b>2. Axile/central</b>  axile placenta seed	The seeds are attached at the center of the fruit.	Orange and tomato 
<b>3. Parietal</b>  parietal placenta seed locule	Seeds are attached to the placenta at the inner wall of the fruit.	Passion fruits and pawpaw 
<b>4. Free central</b>  locule seed free central placenta	Seeds are attached to a placenta that is free within the fruit. The placenta arises at the base of the fruit and projects centrally in the fruit.	Green pepper 
<b>5. Basal</b>  seed basal placenta fruit base (fruit stalk)	The seed is attached at the base of the fruit by a pedicel. A fruit base is the point of attachment of the fruit to the stalk.	Mango and Coconut  funicle basal placenta fruit base
<b>6. Apical</b>  apical placenta fruit stalk	Seed attached at the tip/apex of the inner fruit wall.	Avocado 

## FRUIT/SEED DISPERSAL

This is the scattering or spreading/displacement of fruits and seeds from their parent plants. In some plants, only seeds are dispersed while in others, fruits are dispersed with seeds.

### Importance of dispersal

- i) It helps to prevent overcrowding among plants of the same species.
- ii) It reduces competition between member plants of the same species.
- iii) It helps to minimize the spread of epidemic diseases especially in seedlings if they are crowded.
- iv) It helps plants to colonize new areas which may even be better for the species survival.
- v) It enhances the chances of survival and continuity of the plant species.

**Agents of dispersal include the following:**

- 1) Water,
- 2) Wind

## 3) Animals

## 4) Self-dispersal/ explosive mechanism

Fruits and seeds possess specialized structure to aid their dispersal and are adopted to specific mode of dispersal.

**Characteristics of fruits/seeds dispersed by wind**

- i) They are usually small, light and dry which enables them to easily be carried or flown by wind.
- ii) Some fruits like elm and tecoma have wing like structures that increase their surface area. This helps in delaying the fall of seeds and fruits and increases chances of being blown away.
- iii) Some fruits like tridax and clancletion have parachute-like hairs called pappus which enables them to float and fly by wind.
- iv) Some seeds like silk cotton possess thread-like structures called floss which increase surface area enabling the seeds to float in air.

**Characteristics of fruits/seeds dispersed by animals**

- i) Some fruits such as tomatoes, oranges and mangoes are usually large and brightly coloured especially when ripe. This helps to attract animals.
- ii) Some fruits when ripe are scented e.g. jack fruit. This helps to lure/attract animals.
- iii) Some usually possess edible parts which are succulent / juicy and the only part of the fruit that is eaten and the rest containing the seeds is thrown away e.g. mango and avocado.
- iv) In some fruits, such as guavas, tomatoes, pepper and pawpaw. The whole fruit is eaten and the seed passed out in the faeces because of their resistance to digesting i.e. are indigestible.
- v) Some fruits e.g. Biden pilosa and desmodium possess hooks and sticks in the hair of passing animals. They stick in the fur of animals or on clothing of people.

**Characteristics of fruits/seeds dispersed by water**

They are usually light and contain air space inside which reduces their relative density that enable them float on water easily like the coconut.

**Self-dispersal****a) explosive mechanism**

This happens with dry dehiscent fruits. The pericarp splits open along the sutures to release the seeds. This is made possible due to the tension that is built during the process of dying. E.g. legumes, capsule or follicles

**b) ribbon fruits**

These are succulent, may drop freely from the parent plant. The pericarp then rots, bearing the seeds that are enclosed within a hard protective testa so that it can begin germinating.

*"You can have anything you want-if you want it badly enough. You can be anything you want to be, have anything you desire, accomplish anything you set out to accomplish-if you will hold to that desire with singleness of purpose"* Robert Collier.

**END OF S.1 WORK- CONGRATULATIONS**

**NAMUNGOONA SALAF SECONDARY SCHOOL**

**TERM II ASSESSMENT**

**SENIOR ONE**

Name

Stream

**BIOLOGY PAPER 1**

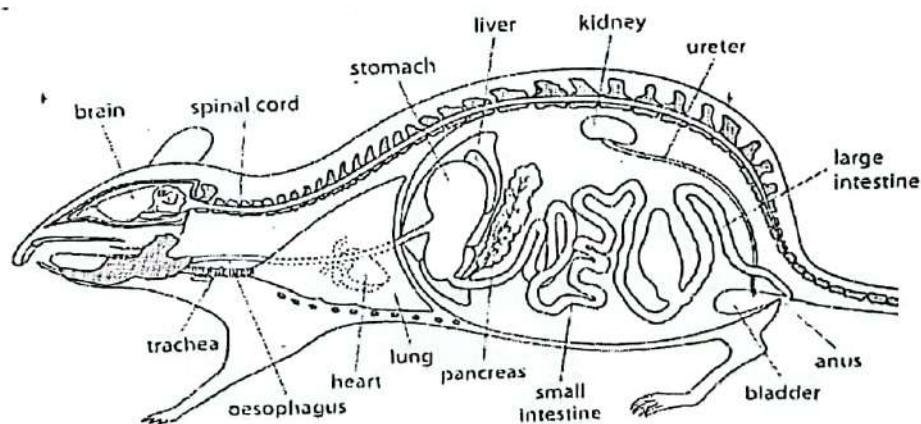
I hour and 30minutes

**Instructions**

Answers must be written in the space provided.

- Use a black or dark blue pen. You may use an HB pencil for any diagrams
- Crossed work may lead to loss of marks

- 
1. The diagram below shows a cross section through a rat. Some of the rats Organ have been labeled.



- a) What term describes the all different organs found in the rat (01mark)

.....

- b) Name the organ labeled in the diagram that is part of the circulatory system (01mark)

.....

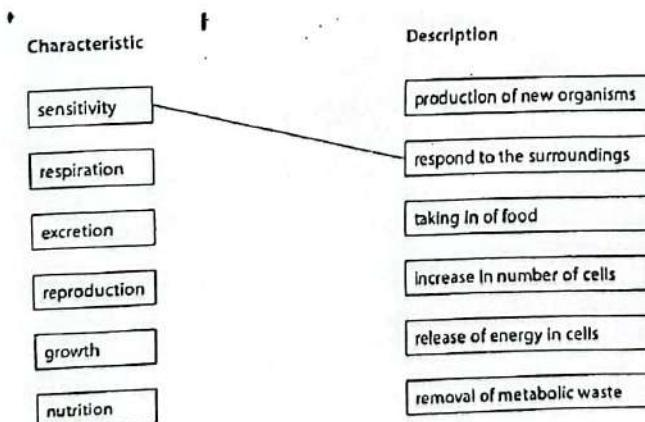
- c) Name three other systems shown in the diagram apart from the circulatory system (03marks)

.....

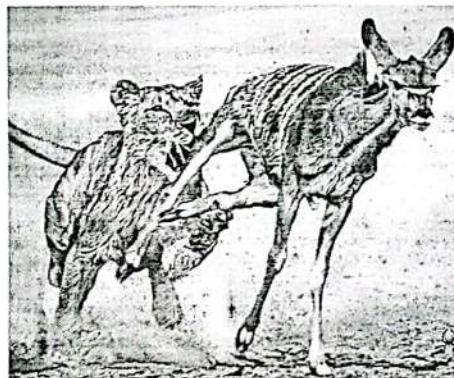
- d) The table below shows lists of several life process that take place in the organs of the rat. Complete the table by naming the correct organ for each life process. [05marks]

Process	Organ
Filtration of blood	
Ventilation	
Insulin secretion	
Hydrochloric acid secretion	
Bile production	

2. a) Living organisms share some basic characteristics. Draw a straight line from each characteristic to its correct description. The first one has been done for you. (04marks)



b) Study the picture below and answer the questions that follow



i) identify the life processes being demonstrated in the picture. (02marks)

.....  
.....

ii) What is the importance of the life processes mentioned above for both animals? Relate your answer to the picture. (04marks)

.....  
.....  
.....

3. A student wrote the scientific name of a housefly as **musca Domestica** while naming the housefly during a biology lesson

a) Identify the mistakes made by the student while writing the name.

.....  
.....  
.....

b) Write the correct scientific name

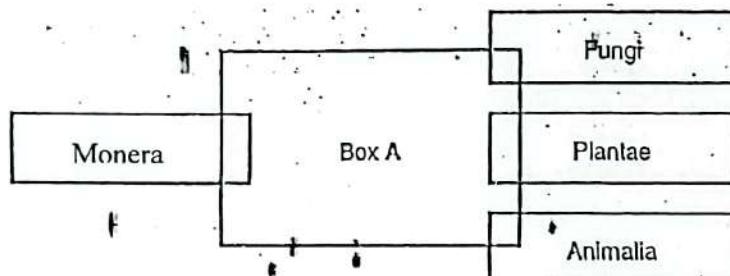
.....

c) Explain why its advised to write scientific names while naming organisms rather than local names. (02marks)

.....  
.....

4. The diagram below shows one way of representing the classification of living organisms into five kingdoms

Box A has been drawn overlapping the other boxes since its member share characteristics with the other kingdom



- a) Which kingdom is represented by box labelled A
- .....
- b) Give one characteristic that the member of the kingdom represented by box A may share with
- Animalia
  - Plantae
  - Monera
- .....
- (give an example where necessary)
- c) Give two reasons why the fungi are place in a separate kingdom from the plantae.
- .....
- .....

- d) Give two examples of organism in kingdom labeled Box A

.....

.....

NAMUNGOONA SALAF SECONDARY SCHOOL

END OF YEAR ASSESSMENT, 2022

SENIOR ONE

BIOLOGY P1

(THEORY)

1hour 30minutes.

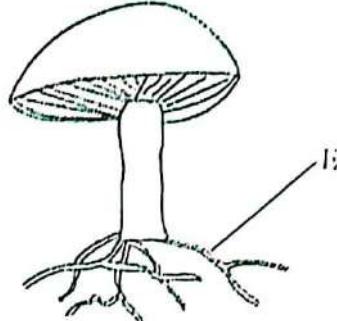
Name..... Stream.....

Instructions

- This paper consists of two sections **A** and **B**. All questions in section A are **compulsory**
  - For section B attempt only **two** question
- 

**SECTION A (30marks)**

1. The diagram below shows an organism in a certain kingdom. Study it carefully and answer the questions that follow.



- a) Name the Kingdom to which the above organism belongs. (01mark)

.....

- b) State the mode of nutrition for the above organism, give a reason for your answer (02mark)

.....

- c) i) Name part labelled E and its role (02mark)

.....

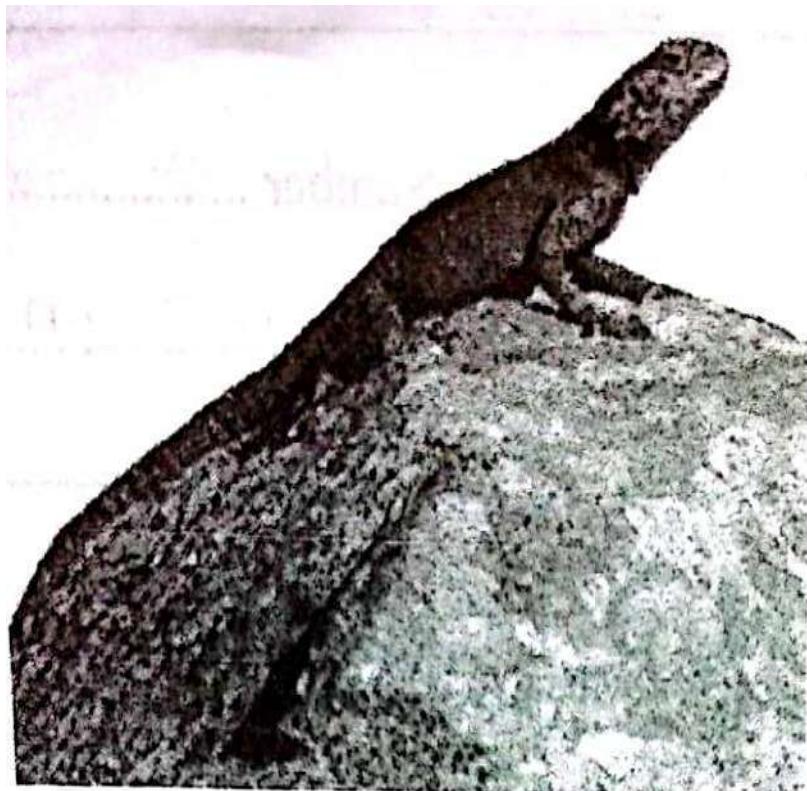
.....

ii) What advice would you give to people in your community who eat such organism (02marks)

.....

.....

2. Below are two photographs E and F taken from their natural habitats



E



F

a) State the class to which the organisms belong (02marks)

E.....

F.....

b) With reference to observable features, explain why the organisms in photographs F is usually found in a wider range of habitats (03mark)

.....

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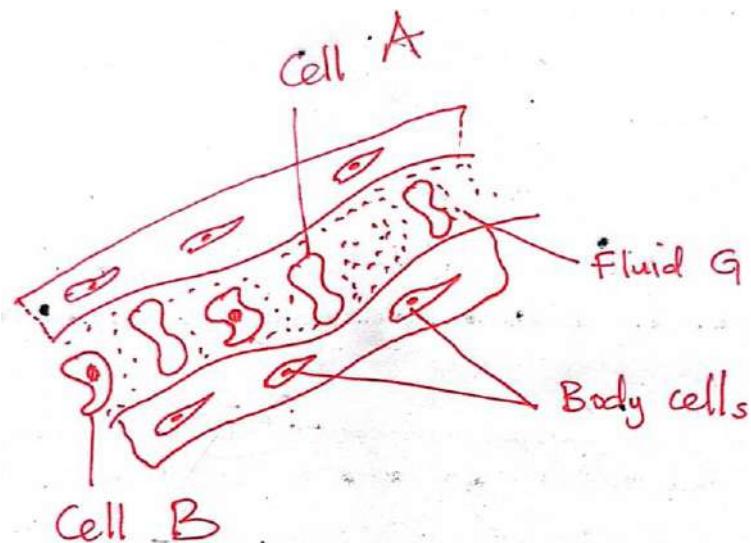
.....

c) State why the organism in photograph E is usually found on top of rocks even during hot, sunny days (01mark)

.....

.....

3. The diagram below illustrates **tissues** and **cells** in a human body



a) Name (03marks)

i) Cell A

.....

ii) Cell B

.....

iii) Fluid G

.....

b) How is Cell A and B important in the human body (02marks)

Cell A

.....  
.....

Cell B

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.....

4. The scientific name of an onion is **Allium cepa**. From the above name

a) Identify (02marks)

i) Genus name

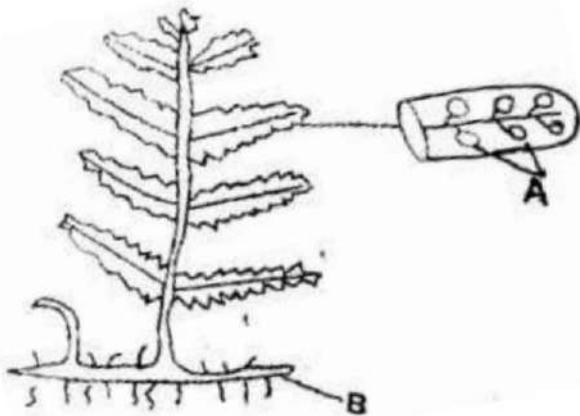
.....

ii) Species name

.....

b) How is the knowledge of naming living things using scientific names is of great importance than using local names? (03marks)

- .....  
.....  
.....  
.....
5. The diagram below represents an organism from a certain kingdom. Study it carefully and answer the questions that follow.



- a) Identify the above organisms (01mark)
- .....
- b) Name parts (02marks)
- A.....
- B.....
- c) How is part A Important for the survival of the organism in its habitat
- .....  
.....

#### SECTION B (20marks)

6. Motor vehicles move, use energy and produce carbon dioxide. Similar characteristics occur in man yet cars are not classified as living. Explain this. (10marks)
7. **Worker Bees** and **worker termites** are said to be social insects and live in colonies. (02marks)
- a) Explain how each insect is adapted to perform its role in the colony
- b) By giving examples, explain why insects should be conserved in our environments. (08marks)

Learner's Name .....

Learner's Number .....

Signature .....

Biology S1

Paper 1

Apr / May

2023

2 hours



HARROAN EDUCATION

UGANDA CERTIFICATE OF LOWER SECONDARY EDUCATION

BIOLOGY SENIOR ONE

PAPER 1

INSTRUCTIONS

2 HOURS

- This paper contains 10 questions in section A and 5 questions in section B
- Answer all questions in section A and only 3 in section B.
- Answer all questions in the spaces provided.

For examiner's use only

Question	1 - 10	11	12	13	14	Total
Marks						

## Section A (50 marks)

### (short term response questions)

Answer all questions in this section

1. Bees normally visit flowers as they are looking for nectar to feed on. The visit of the bees to the flowers is of importance to the bees, to the flowers and to humans. The picture below shows a bee visiting a flower. Use it to answer the questions that follow. (qn 1 and 2)



- a) Outline the life processes carried out by the bee in order from the moment when the bee saw the flower to the moment when the bee picked the nectar. (02 marks)

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- b) Briefly describe how each of the life processes in (a) led to the other from the moment when the bee saw the flower to when it picked the nectar (03 marks)

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2. Plants benefit greatly when bees visit their flowers. When bees feed on pollen and nectar, some pollen sticks to the hairs of the bee's body. When the bee visits the next flower, some of the pollen is rolled off onto the flower which results into a particular life process in plants.

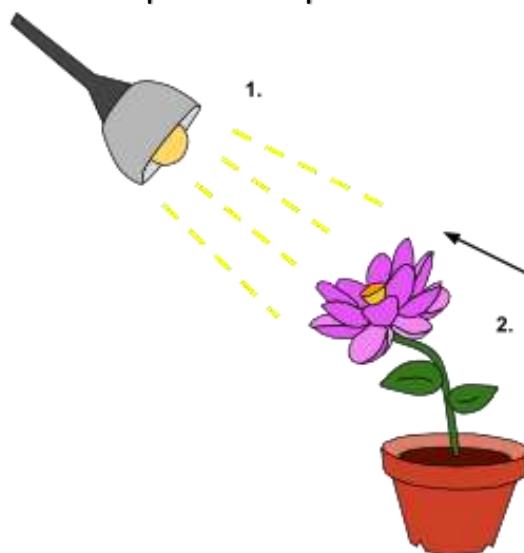
a) With a reason, identify the life process which occurs in plants after bees visiting them (02 marks)

.....  
.....

b) Describe the importance of the life process in (a) above to organisms (03 marks)

.....  
.....

3. Life processes form the basis of existence of organisms on planet Earth. They are essential for an organism to stay healthy and maintain its proper functioning. Below is a picture showing a particular life process in plants.



a) State the life process portrayed in the picture.

.....

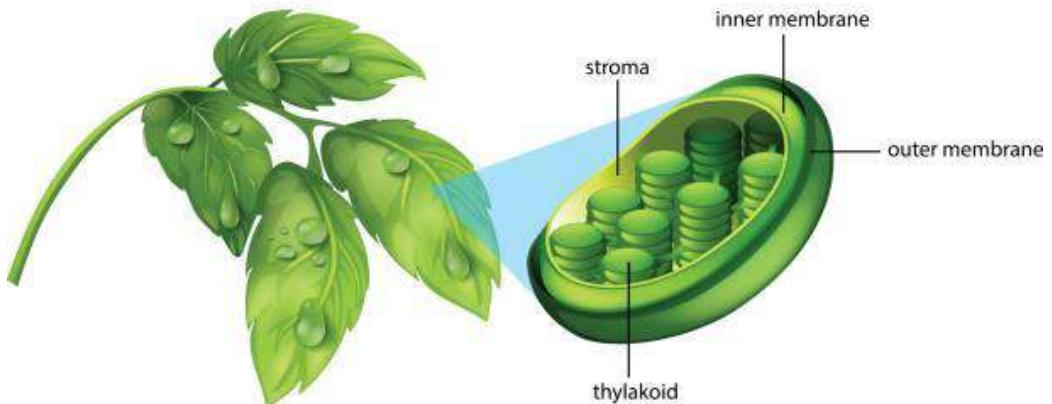
ii) Describe the importance of the life process to the organisms. (02 marks)

.....  
.....

c) Describe 3 ways how humans portray the life process in b) (03 marks)

4. Chloroplasts are round oval shaped organelles within a plant cell involved in the synthesis and storage of food stuffs. They are green in colour due to the presence of chlorophyll

### **Chloroplast in Plant Leaf**



Describe all the effects on the structure and the functioning of a plant cell that would occur incase it loses or lacks a chloroplast. (05 marks)

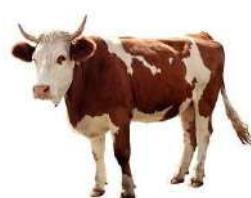
5. Classification is the process of placing organisms in particular groups basing on their similarities in structures and physiological processes. Classification simplifies the identification and the studying of organisms. Below are some organisms; you are to classify them following the given guidelines.



Maize



Goat



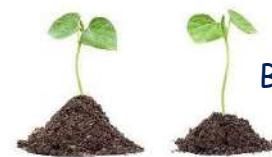
Cow



Tiger



Lion



Bean

a) With reasons, organize them into 2 groups. (write the names of the organisms )

Group1	Group 2

Reasons

(03 marks)

.....

.....

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b) With reasons, further divide the largest group from a) into two groups

Group2a	Group2b

Reasons

(02 marks)

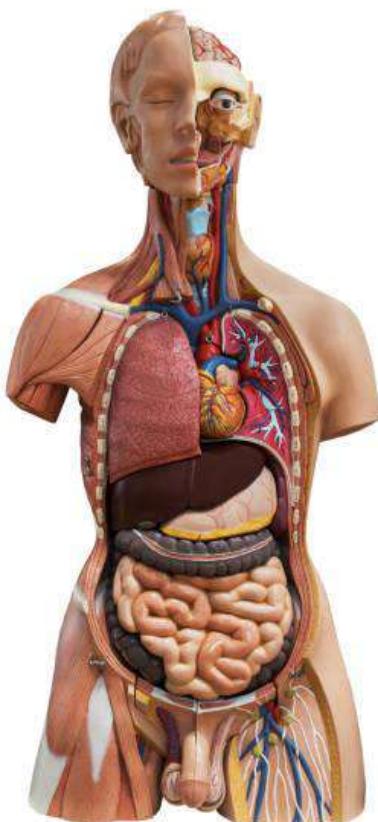
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6. Matovu received a new biology 3d model on his birthday from his mother. The model has various organs of a human body, label and name all the organs you see then state their functions in the space given below. (05 marks)



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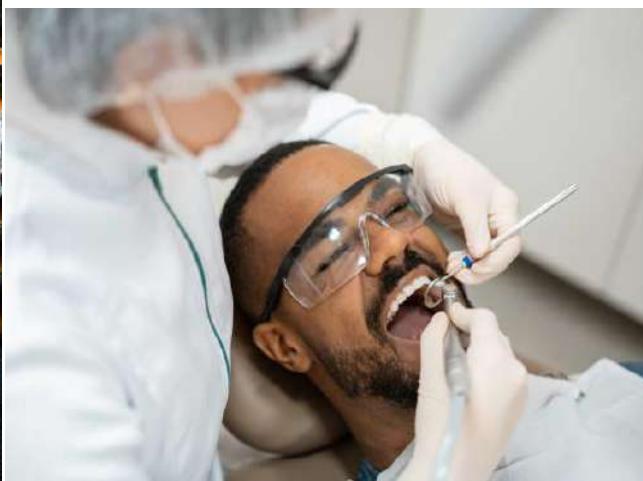
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7. Some of the economic activities carried out around our society involve the knowledge of biology. The pictures below show the economic activities involving the use of biology.



a) Identify the occupations above. (02 marks)

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b) Describe how biology is involved in the occupations above. (03 marks)

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8. Clouds are visible mass of water droplets or frozen crystals suspended in the atmosphere. they play an important role when we are predicting a change in weather.

Describe the characteristics of clouds in the sky which might qualify them as living things and those which dont qualify them. (05 marks)

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9. After missing a biology practical lesson about viewing a plant cell under a light microscope, Nakabiti was tasked by her teacher to go and view the prepared slides which had been viewed by her friends over 4 hours ago in the laboratory. The instructions were to view and draw a plant cell the way you view it under the microscope. Learners were supposed to draw only what they saw not the theoretical drawings.



Draw and label a drawing Nakabiti was to come up with basing on the image above. Draw and label only what you see. Your drawing should have a title, be neat, have a magnification and well labelled. (05 marks)

10. a) One day in class, Mrs. Jane defined locomotion as the complete displacement of the whole organism from one place to another. She then posed a question that should locomotion be included among the life process carried out by all living things. Tom said yes and John said no.



Using the pictures above as a reference, explain who was right; Tom or John. (03 marks)

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.....

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.....

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b). After her evening biology lesson about the 7 characteristics common to all living things, Harriet went back home reciting them that they include growth, reproduction, respiration, sensitivity, excretion, nutrition and movement. When she went back home she found her father looking at a dead rat next to spider web. Wanting to challenge her father, she asked him to name the 7 characteristics common to all living things but to her surprise, her father gave her 8 including death. She sat down and asked herself 2 questions. Is death common to all living things and if yes why didn't Mrs. Jane include it among the characteristics common to all living things.

Explain why death is not included in the life processes common to all living things. (02 marks)

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## Section B (30 marks)

### (Extended response questions)

**Answer only 3 questions in this section**

11). Every aspect of daily life is influenced by biology. People rely on living organisms and their products for fuel, food, houses, personal care, goods, medication and homes. Biology provides answers to widespread problems that might have an impact on people all over the world. It might even be able to solve environmental problems that might have an impact on people all over the world. The pictures below show some involvements of biology in daily life.



You have been chosen by your class teacher to give a speech to your parents on how biology is involved in daily life. In your speech, explain to them 6 different ways biology is involved in daily life. (10 marks)

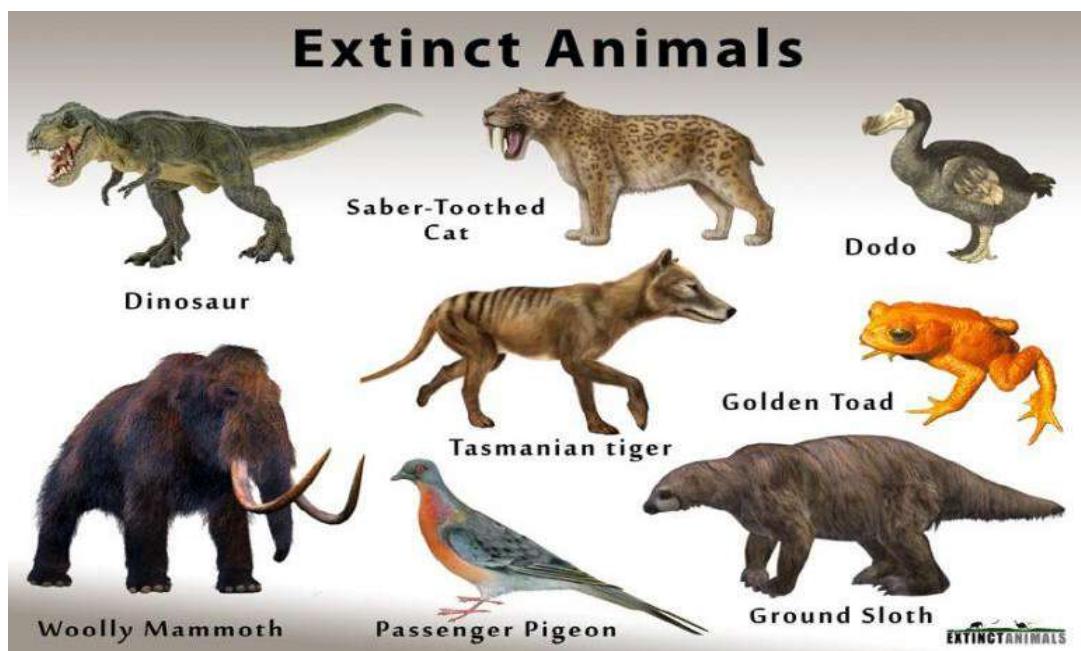
12. Agriculture is one of the most dependable economic activities in the world. Long ago, farmers used the most primitive methods of farming which decreased crop yields, led to outbreak of crop diseases and attracted pests. Farmers depended on rain to decide farming which highly limited crop growth.

The development of agriculture in very many years has greatly changed ways how humans have lived. They have switched from poor methods of farming to improved method using biology and advancement in technology related with biology.



Imagine you time travel back to 1900. Explain various biology related ways you would teach to farmers on how they would improve their crop yields. (10 marks)

13. Animals are classified in their own kingdom called kingdom Animalia. This consists of insects, humans, fish, birds, herbivores, carnivores etc. animals are important in various ways. When a particular species of animals dies and is completely wiped out from their ecosystem, it is called extinction. Extinction is death of the entire species of particular organisms resulting into their total complete wipeout from their habitats. Many organisms have been extinct like dinosaurs, dodo etc. In Uganda some fish species have been extinct from Lake Victoria.



The National Environment Management Authority. (NEMA) is looking for a person to employ as the Environment Education Manager. He or she is responsible for sensitizing people on different ways they can protect the environment and preserve plants and animals to prevent their extinction. Write an application letter for the job. In your application, explain ways you can ensure that animals are conserved (birds, fish, insects etc ) (10 marks)

14. cells are the basic units of life. The cellular level forms the first and the most basic level of organization of organisms. All living and non-living things are made up of one or more unique substances.

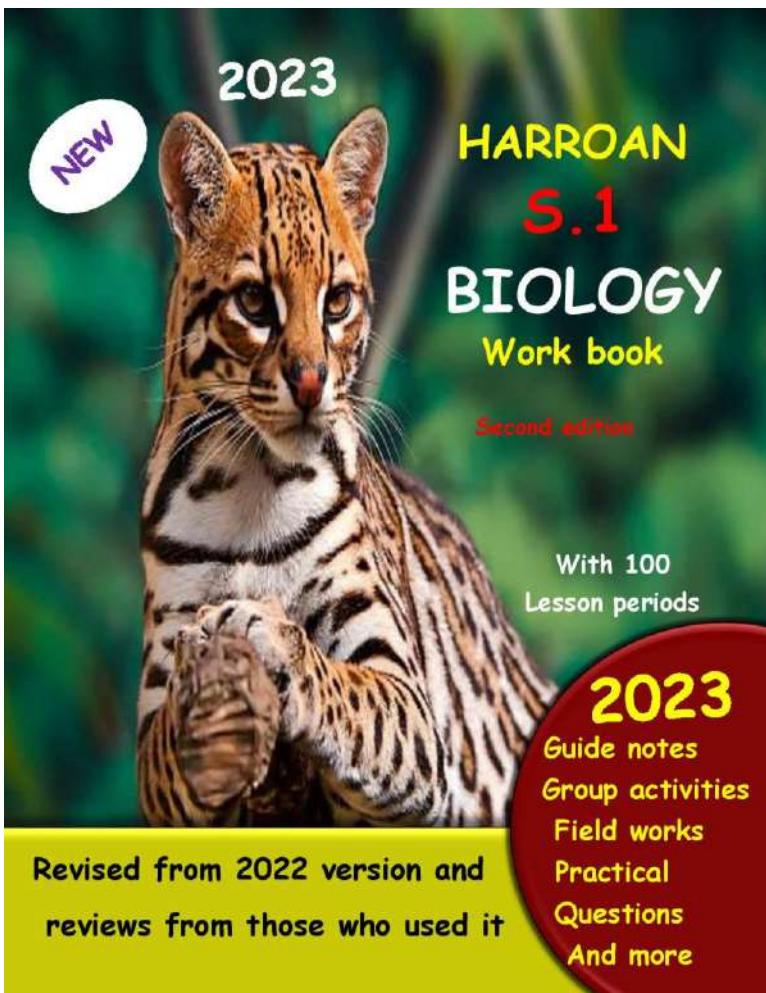
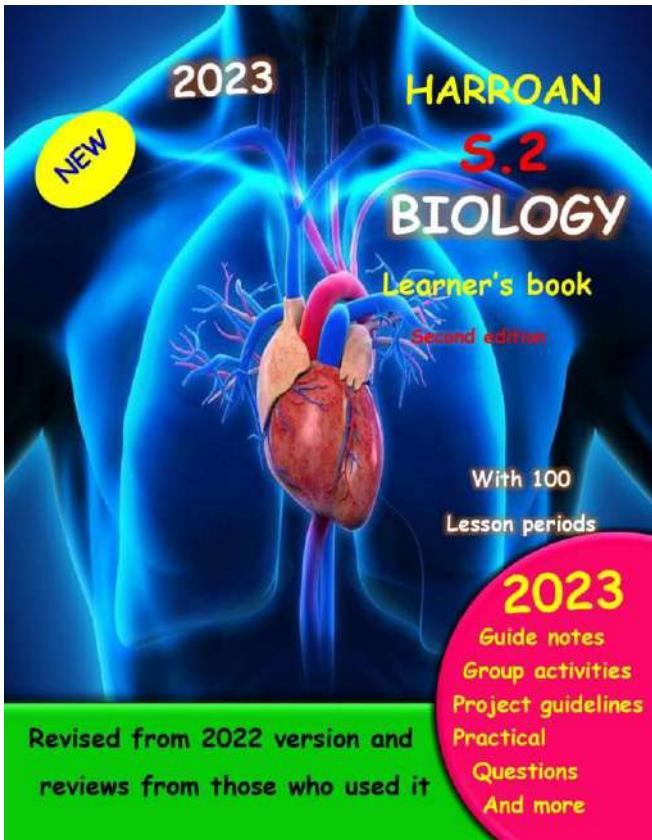
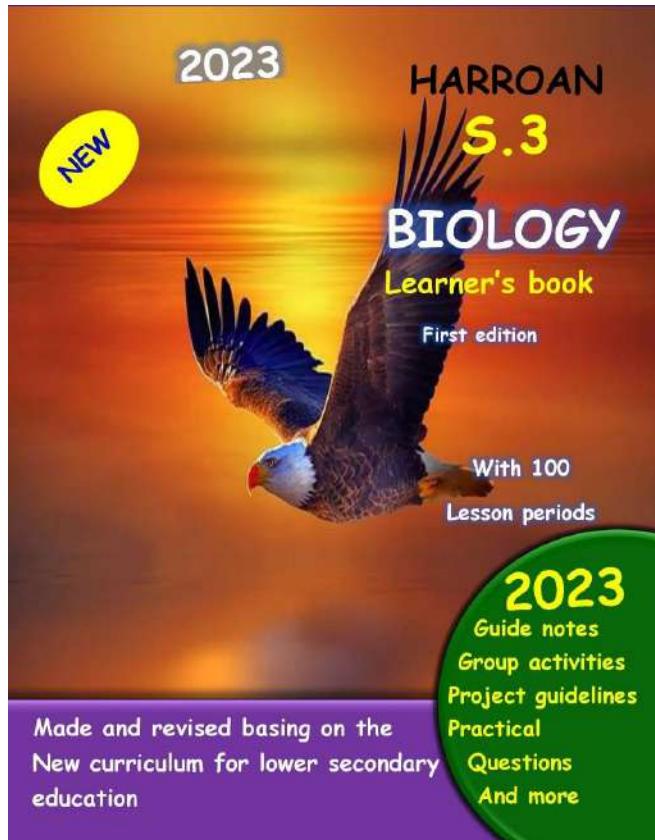
Using particular examples, describe the level of organization from simplest to complex.

15. A desert Island is an uninhabited Island where no people live. Most of the time the water surrounding is not safe for drinking since it is not pure. The water surrounding the Island contains fish and the Island contains trees.



Imagine you are to be placed on a desert Island for more than a week, and you are only to take three things with you to help you survive. Which 3 things would you ask and describe how you would survive for a week with the things you have chosen carrying out all the life processes of living things.

END



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