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

SCHOOL:.....STREAM.....

COMPREHENSIVE BIOLOGY TRANSFORMATION INITIATIVE

LOWER SECONDARY CERTIFICATE OF EDUCATION

COMPETENCE BASED EXAMINATION TERM 1 2023

BIOLOGY PAPER 1

SENIOR ONE

TIME: 2 HOURS

INSTRUCTIONS

- ✓ *This paper consists of five structured questions.*
- ✓ *Attempt all questions in this paper.*
- ✓ *Write answers in the spaces provided.*
- ✓ *No extra answer sheet shall be provided for rough work.*
- ✓ *Use a neat hand-writing to present your answers precisely and carefully.*

FOR EXAMINER'S USE ONLY

NUMBER	MARKS
1.	
2.	
3.	
4.	
5.	
TOTAL	

1. a) Living things in biology are called **organisms**. These are things that have life but no single statement can be written to summarize the meaning of life. However, we describe an organism living, if only when it can exhibit the seven life processes.

Look for these life processes, vertically, horizontally and diagonally in the puzzle below.

(***07marks***)

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

b) List in the table below, ***ONLY*** the life processes you managed to find from the puzzle above and state the function of each life process mentioned to organisms. (***07marks***)

Life process	***Function of the life process***

c) Suggest the ways in which the following life processes are manifested in plants and animals. (***06marks***)

Life process	***Animal***	***Plants***
Movement		
Sensitivity		
Feeding		

2. a) A colleague wants to do biology but he claims that drawings may fail him because he does not know how to make good biology drawings. Guide your friend about 5 does and don'ts he should follow when drawing in biology.

Do's (***05marks***)

……

……

……

……

……

Don'ts (***05marks***)

……

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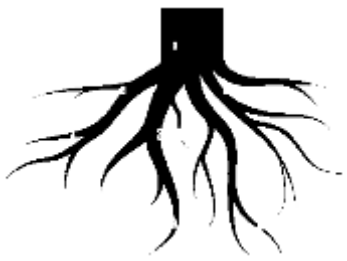
……

b) A friend still needs help on how the information you provided above can be observed. Use the leaf provided to draw, showing only external features for your friend to use it know more on the does and don'ts you gave him. In the space provided aside, use it to show your friend how you can calculate for the magnification of your drawing. (***03marks***)

3. a) The figure below shows structures of different levels of organization in organisms, the levels include cells, tissues, organs and systems.



A

B

C

(i) Name the picture that represents a cell, an organ and a system. Also state the specific name of the structures. In the same table, state the function of each structure on the organism it exists. (***09marks***)

Picture	***Structure***	***Name of the structure***	***Function of the structure to the organism***
A.			
B.			
C.			

b) Read the passage below and use it to answer questions that follow.

CELLS

Cells are the smallest basic functional and structural units of life because all the structures or organs are formed from them and all chemical reactions occur in cells respectively. All these reactions are called **metabolism**. As you can see a school having special areas like HM's office, toilets, kitchen, stores and the school compound, cells have **organelles**. These organelles have special functions and are separated by elaborate membranes from the rest of other parts of the cell. Among them include mitochondria which act as machines that produce and store energy for the cell during the process of respiration. Cells are very organized structures that they don't dump in them waste products from different organelles, they store everything they have in excess in the cell or sap vacuole. Such that they can be later deposited outside. In the cell, there is also the cytoplasm. The cytoplasm provides a wide region for where the mentioned and yet to be learned about organelles can be placed for them to perform better their functions. On addition to that, the cytoplasm also has a central structure called the nucleus. This is so crucial in the cell that it controls metabolism. It is the one that commands for what to enter and leave the cell. This entry and exit the

materials is regulated by the cell membrane which only allows the required materials to enter or to exit the cell. All of these structures are surrounded by the cell wall in some cells which is so tough and strong so that the above components do not pour out like water through a cloth!!!!!

Question

(i) What is the difference between a cell and an organelle? (***02marks***)

……

……

……

……

(ii) Why do you think a cell is considered to be the basic functional unit of life? (***01mark***)

……

……

(iii) From the passage above, which region of the school is similar to the following parts of the cell. (***06marks***)

Cytoplasm……Cell wall……

Nucleus……Sap vacuole……...

Mitochondrion……Cell membrane…….....

(iv) Use the above information to explain what would happen if the cell lacked the following structures. (***02marks***)

Nucleus

……

……

Cell membrane.

……

……

4. a) Biology is a broad branch of science dealing with the distribution, anatomy, origin, behavior and physiology of organisms. Biologists decided to break it down into various branches or fields which deal with specific objectives or areas of study.

State and define any **three** branches of biology. (***06marks***)

……

……

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……

b) Through the study of biology, people acquire knowledge that will enable them achieve a lot of activities or jobs which will improve on their income. Among some include the following shown in the figure below.

1

2

3

(i) Identify the careers opportunities shown above. (***03marks***)

1……2……..

3……

(ii) State the importance of the above persons in the community. (***03marks***)

1……

2……

3……

(iii) How is the study of Biology important in the following fields of the community?

Health. (***03marks***)

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Agriculture. (***02marks***)

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Environment. (***03marks***)

……

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5. a) Among the tools used throughout studies and experiments in biology is a biological report. This helps to summarize what we conducted in the lab, field work or any experiment to the relevant personnels for record keeping and enhancement of learning. A report has specific components as shown below. You are required to match the components with their correct contents given on the right hand side. (***07marks***)

Introduction	A guess about what is expected to be observed in the experiment, starting with "I think……"
Problem	A paragraph that discusses the background information that relates to the laboratory concepts.
Hypothesis	All information collected in the form of charts, tables, drawings, diagram and graphs to explain the observations made in the lab.
Procedures and materials	A place to mention what happened, what was learnt, and any errors that occurred during the experiment.
Data and observation	Statement written in form of a question that shall be based on during the experiment.
Results	Contains the answers to the lab questions or statements of what was observed and recorded.
Conclusion	Defines comprehensively what was done in the laboratory include all the materials used for the experiment.

b) On addition to that, one of the methods of representing information during biological studies is using a pie chart. In an investigation by senior one students to determine the number of organisms and their relationships, the following data was obtained.

Organisms	***Number in the compound***
Cows	30
Jack fruit trees	3
Mushrooms	10
Grasshoppers	120

(i) Represent the above data on a pie chart. Indicate the radius of the pie chart. Show you working in the space provided. (***07marks***)

Calculation

Pie chart

Radius……

(ii) Why do you think there are:

very few jack fruit trees (***01mark***)

……

……

Many grasshoppers in the compound? (***01mark***)

……

……

(iii) State two materials that Jack fruit trees needed to survive. Give the importance of each material. (***04marks***)

……

……

……

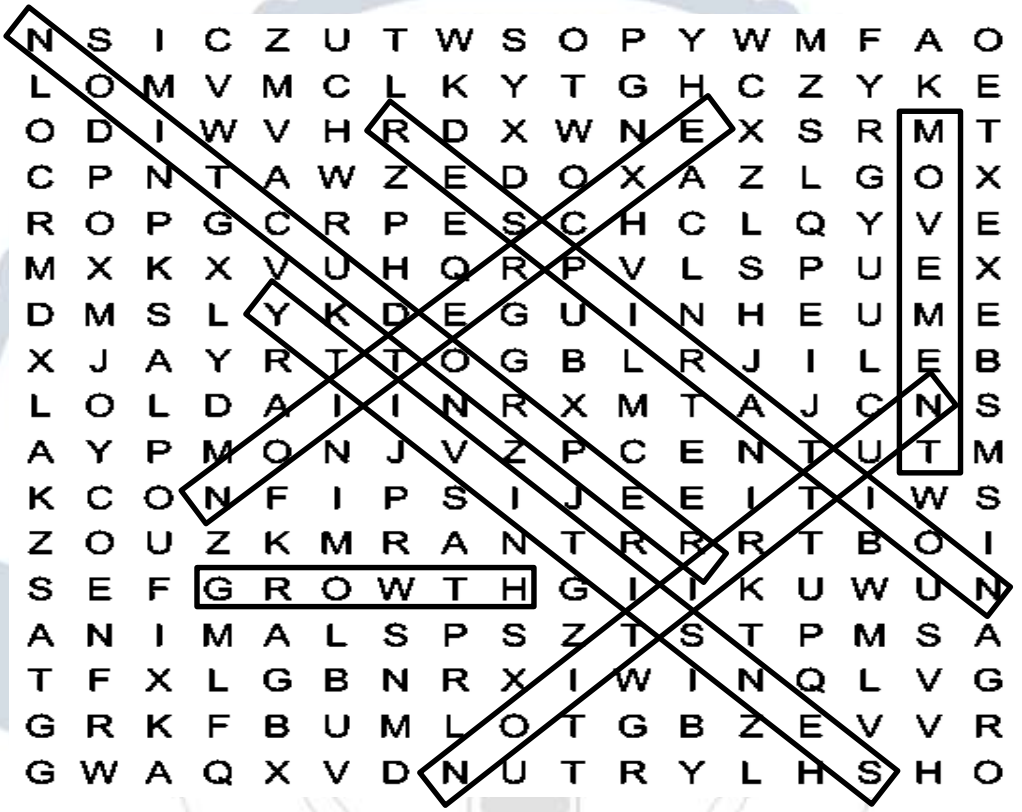
……

END

1. a) Living things in biology are called **organisms**. These are things that have life but no single statement can be written to summarize the meaning of life. However, we describe an organism living, if only when it can exhibit the seven life processes.

Look for these life processes, vertically, horizontally and diagonally in the puzzle below.

(***07marks***)



b) List in the table below, ***ONLY*** the life processes you managed to find from the puzzle above and state the function of each life process mentioned to organisms. (***07marks***)

Life process	Function of the life process	Remark
Reproduction	Enables organism to produce new individuals of the same kind to provide continuity of life or prevent extinction of organisms.	Award: Any correct function of the
Nutrition or feeding	Enables organisms to obtain or manufacture food from their environment which is used for growth, energy provision and immunity.	

Growth	Growth occurs when cells divide and increase in number resulting in an increase in the living matter of the organism to perform different and specific functions	life process. 1 mark @ Rej: If the learner did not identify it from the puzzle above
Excretion	Enables organisms to eliminate waste products of metabolism, excess substances like excessive water, mineral salts and other chemicals, whose accumulation may be harmful from the body. This maintains the proper functioning of life processes.	
Sensitivity	Sensitivity or irritability increases organisms' chances of survival through responses which enables organisms grow or move towards nutrients, away from danger, etc.	
Movement	The movement from one place to another enables search of food, water and mates, to escape from danger due to predators and catastrophic areas like floods, fires and others and to prevent competition from other members.	
Respiration	Respiration enables organisms to take up gases from their medium. Gases are used in the production of energy in the organism. The energy produced during respiration is used to support various life processes such as movement, growth and development	

c) Suggest the ways in which the following life processes are manifested in plants and animals. (***06marks***)

Life process	Animal	Plants	Remark
Movement	Animals exhibit both movement and locomotion. Some examples of movements in animals include: flexing or extending the arm, turning of the neck, chewing of food, blinking, etc.	Plants do not exhibit locomotion, but show movement of some parts of in response to growth. These movements include: shoots grow towards light and roots grow towards water,	Award: Any correct example of movement in plants and animals. 1 mark @

		opening and closing of petals, folding of grass when touched, opening and closing of stomata in response to sun light and others.	
Sensitivity	**Animals respond to different stimuli such as pressure, heat, sound and light for example you accidentally touch a hot surface, you withdraw your hand very quickly.**	**Plants slowly respond to stimuli such as light, water, touch, and gravity. The growth of a plant towards light is a response to stimulus.**	**Award:** **Any correct example of sensitivity in plants and animals.** **1 mark @**
Feeding	**Animals feed on already manufactured food. They obtain the food by feeding on plants and/or on other animals. The food is then broken down during digestion. The end products of digestion are absorbed in to body cells and then assimilated to provide energy in order to maintain other life processes.**	**plants make their own food through the process of photosynthesis, utilizing simple inorganic substances such as carbon dioxide, water and light energy from the sun.**	**Award:** **Any correct statement for feeding in plants and animals.** **1 mark @**

2. a) A colleague wants to do biology but he claims that drawings may fail him because he does not know how to make good biology drawings. Guide your friend about 5 does and don'ts he should follow when drawing in biology.

Do's (***05marks***)

Should have title; magnification; neat; accurate; bigger than the specimen; label lines should be horizontal; should be closed; single outline, etc.

Don'ts (***05marks***)

Do not shade; Do not use ink or pen to draw; No frame or boundaries; No arrows used as label lines;

b) A friend still needs help on how the information you provided above can be observed. Use the leaf provided to draw, showing only external features for your friend to use it know more on the does and don'ts you gave him. In the space provided aside, use it to show your friend how you can calculate for the magnification of your drawing. (***03marks***)

Labelled drawing showing external features of a dicot leaf.

Specimen size = 5.4cm

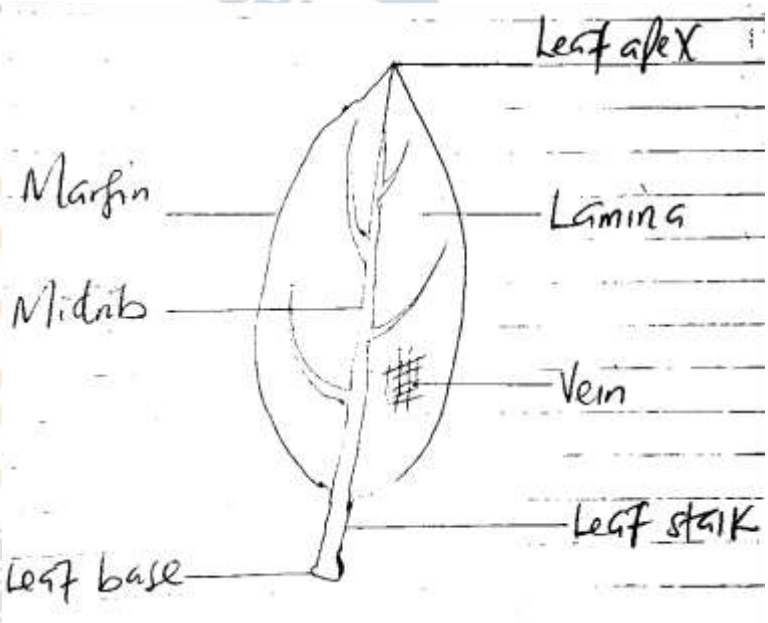
Drawing size = 10.3cm

Magnification $= \frac{\text{Size of drawing}}{\text{size of specimen}}$

$= \frac{10.3\text{ cm}}{5.4\text{ cm}}$

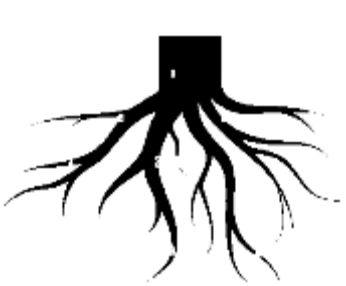
= 1.90740740……

≈ 2



X2

3. a) The figure below shows structures of different levels of organization in organisms, the levels include cells, tissues, organs and systems.



A

B

C

(ii) Name the picture that represents a cell, an organ and a system. Also state the specific name of the structures. In the same table, state the function of each structure on the organism it exists. (***09marks***)

Picture	Level of organization	Name of the structure	Function of the structure to the organism	Remark
A.	System;	Root system;	Used by plants for anchorage; and absorption of water and mineral salts from the soil;	Award: For any correct response 09 marks
B.	Organ;	Kidney;	Used by vertebrates to remove waste products of metabolism like urea from the body. Or to filter blood or to form urine.;	
C.	Cell;	Sperm cell;	Fertilizes the ovum to form a zygote in animals;	

c) Read the passage below and use it to answer questions that follow.

CELLS

Cells are the smallest basic functional and structural units of life because all the structures or organs are formed from them and all chemical reactions occur in cells respectively. All these reactions are called **metabolism**. As you can see a school having special areas like HM's office, toilets, kitchen, stores and the school compound, cells have **organelles**. These organelles have special functions and are separated by elaborate membranes from the rest of other parts of the cell. Among them include mitochondria which act as machines that

produce and store energy for the cell during the process of respiration. Cells are very organized structures that they don't dump in them waste products from different organelles, they store everything they have in excess in the cell or sap vacuole. Such that they can be later deposited outside. In the cell, there is also the cytoplasm. The cytoplasm provides a wide region for where the mentioned and yet to be learned about organelles can be placed for them to perform better their functions. On addition to that, the cytoplasm also has a central structure called the nucleus. This is so crucial in the cell that it controls metabolism. It is the one that commands for what to enter and leave the cell. This entry and exit the materials is regulated by the cell membrane which only allows the required materials to enter or to exit the cell. All of these structures are surrounded by the cell wall in some cells which is so tough and strong so that the above components do not pour out like water through a cloth!!!!!

Question

(i) What is the difference between a cell and an organelle? (***02marks***)

Cells are the smallest basic functional and structural units of life; while organelles are structures in the cell with special functions and are separated by elaborate membranes from the rest of other parts of the cell;

(ii) Why do you think a cell is considered to be the basic functional unit of life? (***01mark***)

Because all chemical reactions occur in cells;

(iii) From the passage above, which region of the school is similar to the following parts of the cell. (***06marks***)

Cytoplasm:	**School compound;**	Cell wall:	**School fence;**
Nucleus:	**HM's office;**	Sap vacuole:	**Store;**
Mitochondrion:	**Kitchen;**	Cell membrane:	**School gate;**

(iv) Use the above information to explain what would happen if the cell lacked the

following structures. (*02marks*)

Nucleus: **All activities inside the cell shall not function efficiently;**

Cell membrane. **There shall be uncontrolled entry and exit of materials in and out of the cell;**

4. a) Biology is a broad branch of science dealing with the distribution, anatomy, origin, behavior and physiology of organisms. Biologists decided to break it down into various branches or fields which deal with specific objectives or areas of study.

State and define any **three** branches of biology. (*06marks*)

Botany – study of plants;
Zoology – study of animals;
Entomology – study of insects;

b) Through the study of biology, people acquire knowledge that will enable them achieve a lot of activities or jobs which will improve on their income. Among some include the following shown in the figure below.

1

2

3

(iv) Identify the careers opportunities shown above. (*03marks*)

1. **Veterinary doctor;**
2. **Environmentalists;**
3. **Game ranger;**

(v) State the importance of the above persons in the community. (*03marks*)

1. **Treats domestic animals;**
2. **Conserve the environment by planting trees and other practices;**
3. **Takes care of animals in the game park or reserve;**

(vi) How is the study of Biology important in the following fields of the community?

Health. (***03marks***)

Identification of diseases and their causative agents;
Development of drugs like vaccines;
Know practices that ensure hygiene and sanitation such as dangers of irresponsible sexual behaviour, poor feeding habits etc.;

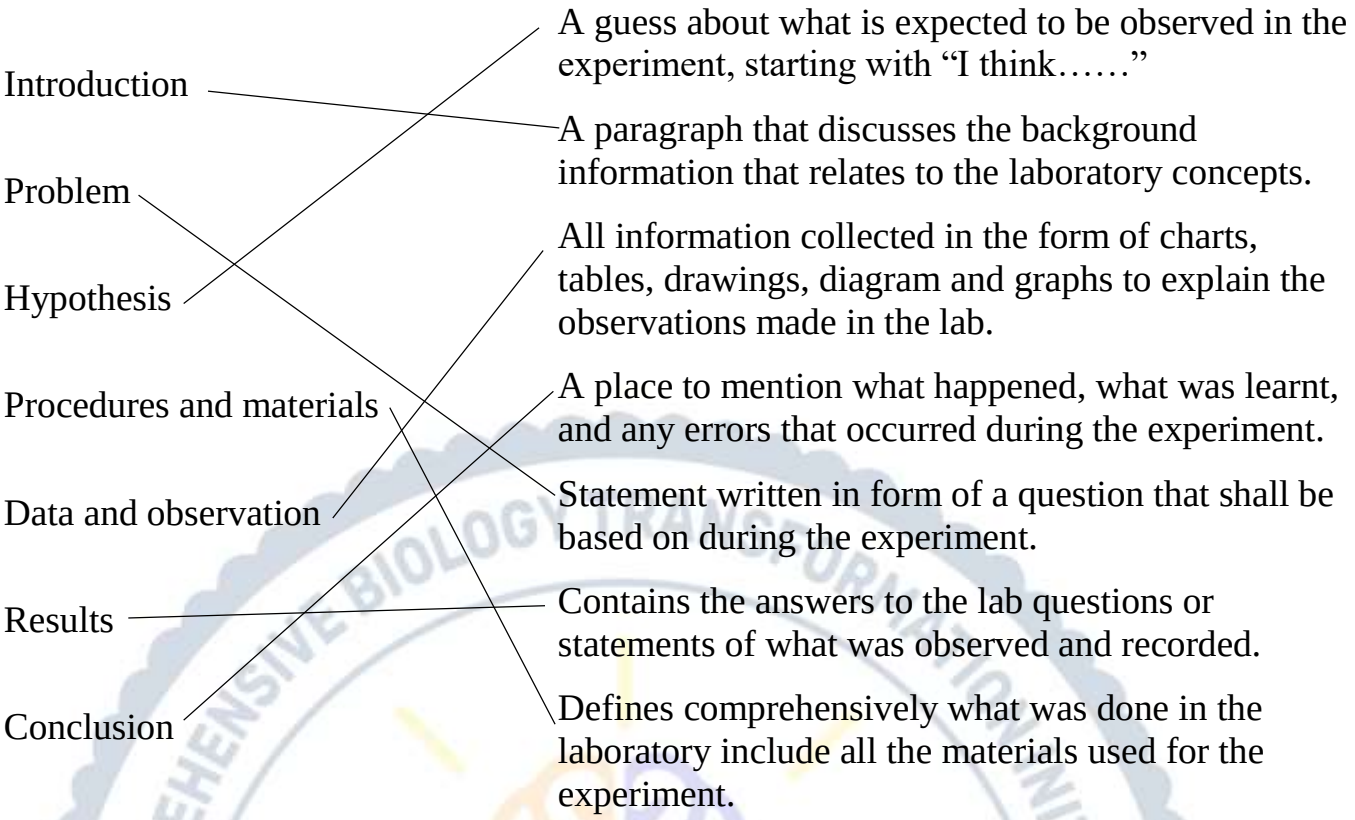
Agriculture. (***02marks***)

Development of crop and animal varieties that are fast-growing, resistant and high yielding;
Invention and usage of superior farming methods like hydroponics;
Development of better methods of controlling weeds as well as plant and animal diseases and pests;

Environment. (***03marks***)

Equips us with the idea of conserving the environment through planting trees; conserving soil; using energy efficient technologies like wind, solar energy and nuclear energy other than using trees; controlling all forms of pollution;

5. a) Among the tools used throughout studies and experiments in biology is a biological report. This helps to summarize what we conducted in the lab, field work or any experiment to the relevant personnels for record keeping and enhancement of learning. A report has specific components as shown below. You are required to match the components with their correct contents given on the right hand side. (***07marks***)



c) On addition to that, one of the methods of representing information during biological studies is using a pie chart. In an investigation by senior one students to determine the number of organisms and their relationships, the following data was obtained.

	Number in the compound
Cows	30
Jack fruit trees	3
Mushrooms	10
Grasshoppers	120

(iv) Represent the above data on a pie chart. Indicate the radius of the pie chart. Show you working in the space provided. ***07marks***)

Calculation

Total organisms = 30+3+10+120

= 163 organisms

Angles for cows $= \frac{30}{163} \times 360 = 66^0$

Angles for trees $= \frac{3}{163} \times 360 = 7^0$

Angles for mushrooms

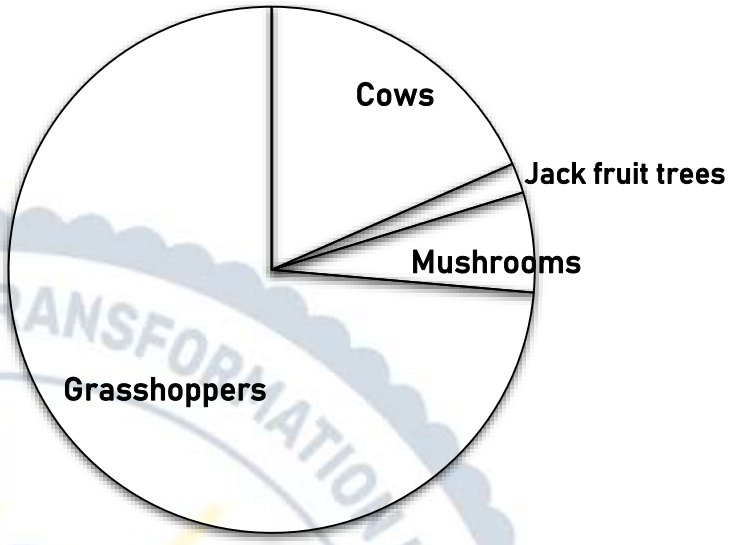
$= \frac{10}{163} \times 360 = 22^0$

Angles for grass hoppers

$= \frac{120}{163} \times 360 = 265^0$

Pie chart

Pie chart of organisms in the compound



Radius: 2 – 5 cm;

(v) Why do you think there are?

very few jack fruit trees (***01mark***)

The trees were fed on by the many grass hoppers;

Many grasshoppers in the compound? (***01mark***)

They had enough food (the trees); had few or no predators;

(vi) State two materials that Jack fruit trees needed to survive. Give the importance of each material. (***04marks***)

Carbon dioxide: Used in photosynthesis for the plant to make its own food;

Water: For photosynthesis;

Mineral salts: To make chlorophyll that traps sunlit energy for photosynthesis;

Any 2

END