Biology
Paper 1
Sample paper 2021
2 hours

Uganda Certificate of Lower Secondary Education

Biology

Paper 1

2 hours

CANDIDATE NAME: _____

CANDIDATE NUMBER: _____

CENTRE NUMBER: _____

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):

Attempt ALL questions in this section

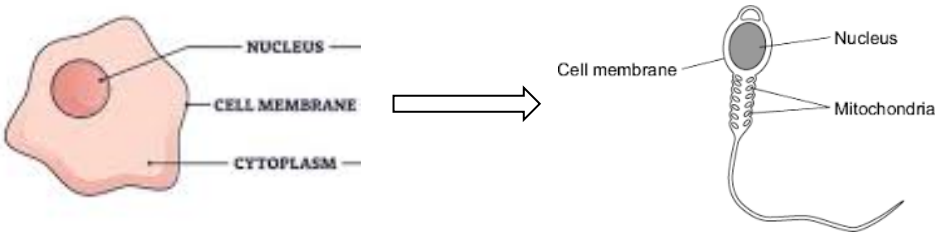
1. Study the pictures of common organisms in our environment.

a) Using the knowledge of classification, put these organisms into two appropriate biological groups (2 marks)

b) (i) Chose one of the groups above and explain why you put those organisms in the same group (2 marks)

2. Cell A is an animal cell which changed into cell B as shown below:

Cell A Cell B



a) What change took place?(2marks)

b) Explain the change mentioned in a) above(2 mark)

c) What biological description is given to cell B? (1 mark)

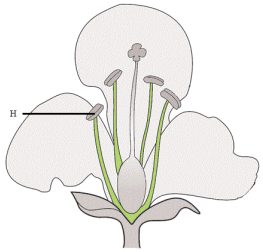
3. A laboratory technician went to the bush to collect specimens. On returning, he noticed many fruits of black jack on his trouser. He picked and threw them away in the compound.

a) What biological advantage did the black jack achieve? (2 marks)

b) Briefly explain how the black jack fruits were able to achieve the advantage mentioned in (a) above. (2marks)

c) How does the achievement mentioned in (a) above contribute to the success of black jack plant species?
(2marks)

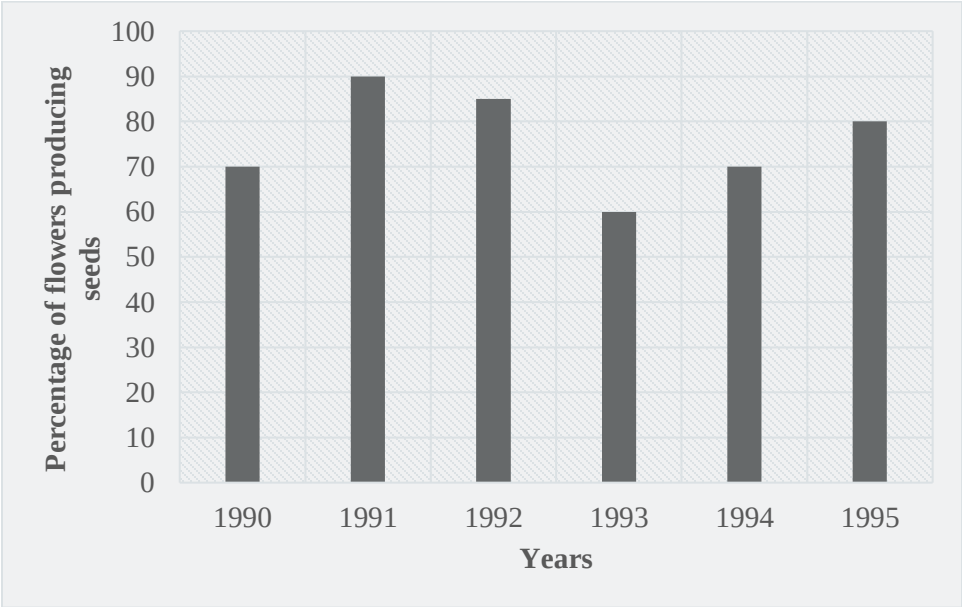
4. (a) The diagram shows a section through a flower



(i) Name the structure labelled H on the diagram (1 mark)
Mark the diagram with the letter X to show the exact position where fertilization occurs. (1 mark)

(ii) Using a feature shown in the diagram and suggest an agent that is responsible for pollination of the flower. (2 mark)

b) The chart below shows the percentage of sunflowers that produced seeds in a garden between 1990 and 1995 together with the average environmental temperature. Use the information to answer the questions that follow.



Year	1990	1991	1992	1993	1994	1995

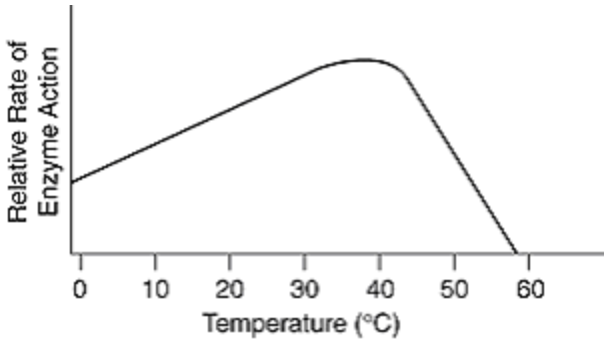
Average Environment Temperature (^oC)	8	11	9	7	8.1	10

(i) In which three years were the fewest plants pollinated? (1 mark)

(ii) What do these three years have in common? (1 mark)

(iii) What conclusion can you draw from your answers in (i) and (ii) above? (2 marks)

5. The graph shows enzyme activity under a given condition. Study the graph and answer the questions that follow.



a) (i) What the does graph show? (1mark)

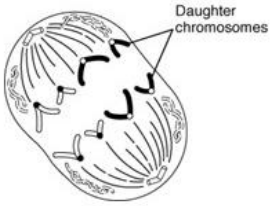
(ii) Based on graph, what general statement can be made about the optimum temperature of different enzymes? (1 mark)

b) (i) What is the effect on the enzyme if temperature is increased beyond the optimum value? (1mark)

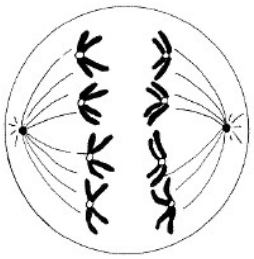
(ii) What is the effect on the rate of reaction if temperature is increased beyond the optimum value? (1mark)

6. The figure below shows two cells: **P** and **Q** which were taken from different parts of the same plant. Each cell is at a certain stage of cell division. Cell P was taken from a side branch and cell Q was taken from the ovary.

Cell **P**



Cell **Q**



a) What type of cell division is represented by:

(i) Cell P (1 mark)

(ii) Cell Q (1 mark)

b) What is the role of the cell division taking place in:

(i) Cell P (1 mark)

(ii) Cell Q (1 mark)

7. The heart is a specialized organ in the human body.

a) Name the specialized function of the human heart (1mark)

b) How is the human heart specialized to the function you have named in (a) above? (1mark)

c) Why would the human heart be inefficient if it was not divided into four chambers? (3 marks)

8. A couple has four children. The first three children born were girls and then a boy was born fourth. The couple is expecting their fifth child. The father is 100% sure that the fifth child will be a boy. Show how you would demonstrate to the father that the chance of producing a boy is NOT 100%.
(4marks)

SECTION B (60 MARKS)

Attempt ANY FOUR questions in this section

11. A student feeling thirsty sees a bottle of water on the table. He picks and drinks the water.

(a) What are the actions involved in the process of picking the bottle of water to the mouth? (12 marks)

(b) Explain why a dog which has lost its senses stops being useful in defending the home?
(3 marks)

12. A family bought a piece of cultivated land on a hilly place.

a) Describe the problem that the soil would experience during a rainy season.
(1 mark)

b) What advice would you give to this family to reduce the problem on their land?
(14 marks)

13. The Ministry of Health in Uganda has a programme on vectors and disease control in communities around Lake Regions. The most recent was on treated nets distribution.

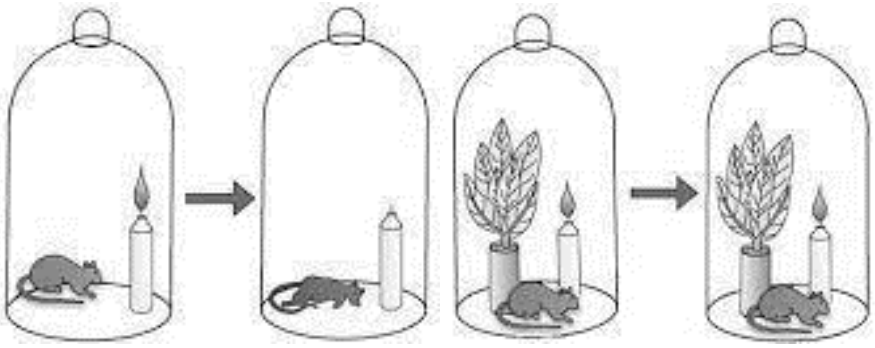
a) i) What is a vector? (1 mark)

ii) Suggest the aim of the above programme by the ministry of health. (1 mark)

b) Suggest to the communities any other ways that can be carried out to achieve the aim of the programme named in (a)(ii) above.
(13 marks)

14. The diagram below shows an experiment that was conducted by a scientist called Joseph Priestly in 1772. In this experiment, it was assumed that heat had no effect on the organisms.

Experiment setup A Experiment setup B



At start of the After some hours At start of the After some hours

experiment rat is dead experiment rat is still alive

a) Describe and explain what happened in both experiment set A and B
(13 marks)

b) What logical conclusion do make from the observation from set A and B?
(2marks)

15. A community in Uganda, is cutting down trees in a nearby forest to create new space for farming because food yields from the land they are currently using has declined. A government authority has stopped them from clearing the forest. The community members see no reason why they should be stopped.

a) What general term or phrase would be used to refer to what the community is doing to the forest? (1mark)

b) Write an essay to the community which will make them to appreciate the government's action and how they can stay on their current land. (14 marks)

16. 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 marks)

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

c) Suggest way forward to help the teenagers. (6 marks)

END

4.2 Sample Marking Guide for Theory Paper

SAMPLE MARKING GUIDE
BIOLOGY THEORY PAPER I

SECTION A (40marks)

1. Study the pictures of common organisms in our environment.

a) Using the knowledge of classification, put these organisms into two appropriate biological groups (2marks)

Reptiles/Reptilia Insects/Insecta

Snake and Lizard ***Bee and Termite***

Scores 2 if places two correct organisms in each of the two groups

Scores 1 if places two correct organisms in one group

b) (i) Choose one of the groups above and explain why you put those organisms in the same group (2 marks)

Reptilia: their bodies are covered with scales

Or

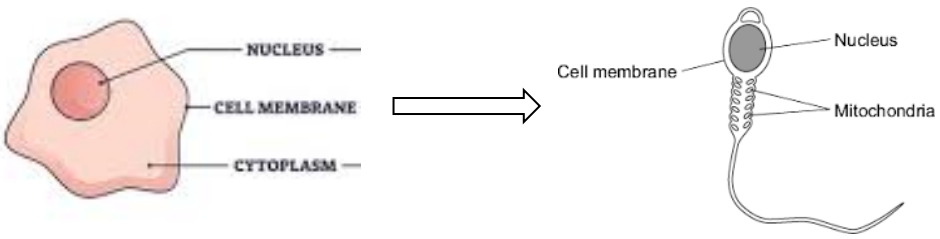
Insecta: Body divided into distinct head, thorax and abdomen

Have six legs/3 pair of legs

(2 marks, consider observable characteristics only)

2. Cell A is an animal cell which changed into cell B as shown below:

Cell A Cell B



a) What change took place?

Cell A underwent structural modification ; by developing a tail and a head ; (2marks)

Scores 2 if mentions type of modification OR states the two parts that were formed

Scores 1 if mentions one of the parts that were formed

b) Explain the change mentioned in a) above

The modification was to enable the cell to swim and reach the ovum ; (2 mark)

Scores 2 if mentions the action and purpose
Scores 1 if mentions either the action or purpose

c) What biological description is given to cell B?
B is described as a specialized cell ; (1 mark)

3. A laboratory technician went to the bush to collect specimens. On returning, he noticed many fruits of black jack on his trouser. He picked and threw them away in the compound.

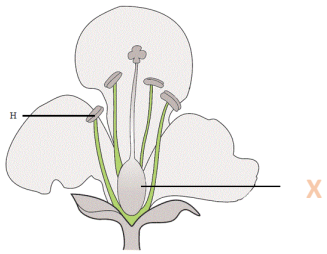
a) What biological advantage did the black jack achieve? (2marks)
Seed/fruit dispersal ; the black jack fruit is carried/dispersed to a new area where it can germinate/grow
Scores 2 if mentions the process and its purpose
Scores 1 if mentions either the process or purpose

b) Briefly explain how the black jack fruits were able to achieve the advantage mentioned in (a) above.
(2marks)
The mature fruit is light in weight ; and has hooks ; which enable it to attach its self onto the trouser of the animal/man ;
Scores 2 if states the features and gives a reason
Scores 1 if states either the feature OR a reason only.
c) How does the achievement mentioned in (a) above contribute to the success of black jack plant
species? (1marks)

- ***Colonization of new habitat to avoid competition for space and nutrients ;***
- ***Moving away from unfavorable conditions/diseases ;***

(Any correct one)

4. (a) The diagram shows a section through a flower



(iii)Name the structure labelled H on the diagram (1 mark)

Anther head ;

(iv)Mark the diagram with the letter X to show the exact position where fertilization occurs. (1 mark)

(v) Using a feature shown in the diagram and suggest an agent that is responsible for pollination of the flower. (2 mark)

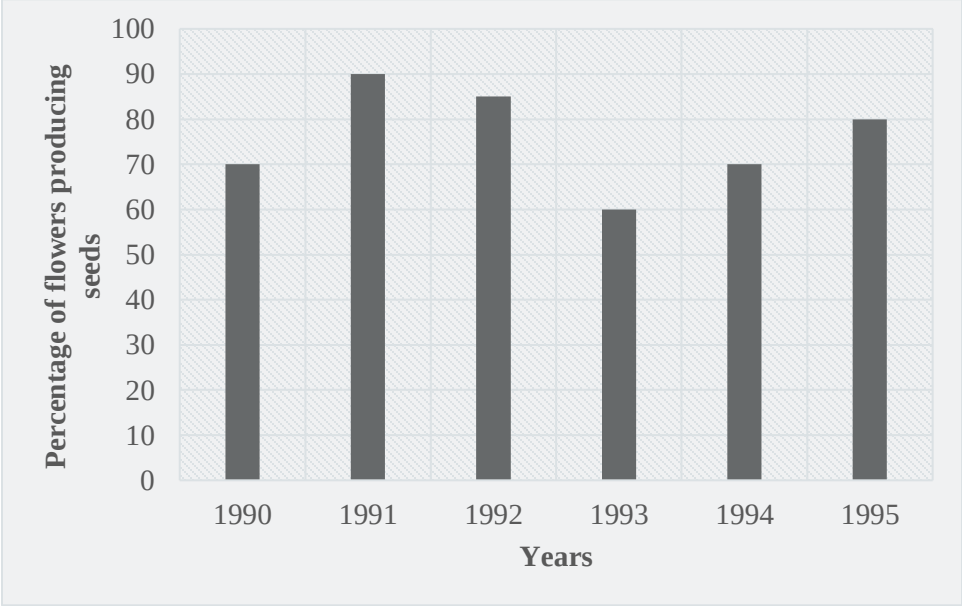
Feature: Brightly coloured/ enclosed stamen and pistil.

Agent: Insect / bird

Scores 2 if states both the feature and agent

Scores 1 if states either feature OR agent only

b) The chart below shows the percentage of sunflowers that produced seeds in a garden between 1990 and 1995 together with the average environmental temperature. Use the information to answer the questions that follow.



Year	1990	1991	1992	1993	1994	1995
Average Environment Temperature (^oC)	8	11	9	7	8.1	10

(iv) In which three years were the fewest plants pollinated? (1 mark)

1990, 1993, 1994

Scores 1 if states all the three correct years

(v) What do these three years have in common? (1 mark)

Years average environmental temperatures in ^{0} C were lower than the rest

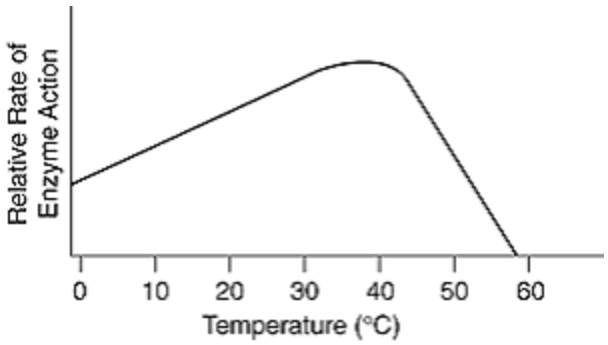
(vi) What conclusion can you draw from you're answers in (i) and (ii) above? (2 mark)

Tem*perature affects pollination and consequently number of flowers producing seeds.*

Scores 2 if shows a correlation between all three factors (temperature, pollination and seed production)

Scores 1 if shows a correlation between any two factors (temperature, pollination and seed production)

5. The graph shows enzyme activity under a given condition. Study the graph and answer the questions that follow.



a) (i) What does the graph show?
(1mark)

The effect of temperature on enzyme catalyzed/controlled reaction ;

(ii) Based on graph , what general statement can be made about the optimum temperature of different enzymes? (1 mark)

Enzymes function best at about 40^{0}C/ optimum temperature for enzymes is about 40^{0}C

b) (i) What is the effect on the enzyme if temperature is increased beyond the optimum value? (1mark)

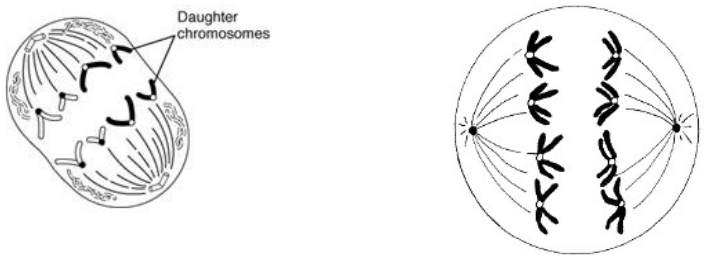
Enzyme would be denatured/change structure ;

(ii) What is the effect on the rate of reaction if temperature is increased beyond the optimum value? (1mark)

Rate of reaction would greatly decease/reaction would stop ;

6. The figure below shows two cells: **P** and **Q** which were taken from different parts of the same plant. Each cell is at a certain stage of cell division. Cell P was taken from a side branch and cell Q was taken from the ovary.

Cell **P** Cell **Q**



a) What type of cell division is represented by: (2marks)

(i) Cell **P** ***Mitosis ;***

(ii) Cell Q ***Meiosis ;***

b) What is the role of the cell division taking place in: (2marks)

(i) Cell **P** ***Multiplying the number of cells ;***

(ii) Cell Q ***Making of gametes/reproductive cells ;***

7. The heart is a specialized organ in the human body.

a) Name the specialized function of the human heart

(1mark)

Pumping blood to the different parts of the body ;

b) How is the human heart specialized to the function you have named in (a) above?

(1mark)

it has thick muscles ;

c) Why would the human heart be inefficient if it was **not** divided into four chambers?

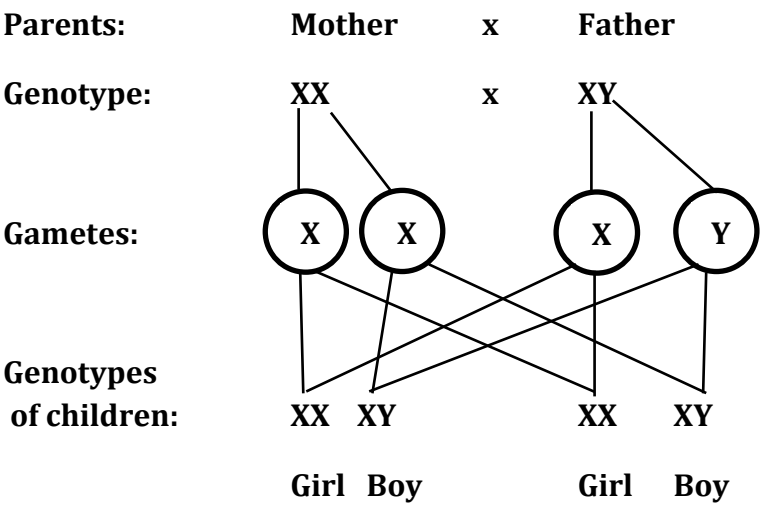
(3 marks)

- ***Deoxygenated blood would mix with oxygenated blood ;***
- ***Incoming blood into the heart would mix with outgoing blood from the heart ;***
- ***Would not provide proportionate pressure in the blood flow circuit.***

(1 mark @)

8. A couple has four children. The first three children born were girls and then a boy was born fourth. The couple is expecting their fifth child. The father is 100% sure that the fifth child will be a boy. Show how you would demonstrate to the father that the chance of producing a boy is

NOT 100%.
(4marks)



The probability that the child will be a boy is 2/4 which is 50%

OR

The parents have a genotype: mother XX and father XY ;

Possible gametes from parents are X from mother ; and X or Y from father ;

During fertilization the possible zygote genotype are XX ; or XY ;

These result in XX for girl ; and XY for boy ;

Therefore, the probability of a child being a boy is ½ which is 50%;

(maximum 4 marks)

Scores 4 if states: Parents genotype, gametes, children's genotypes and correct probability

Scores 3 if states: Parents genotype, gametes and children's genotypes

Scores 2 if states: Parents genotype, and gametes

Scores 1 if states: Parents genotype only

SECTION B (60 marks) (15 marks for question)

Attempt ANY FOUR questions in this section

11. A student feeling thirsty sees a bottle of water on the table. He picks and drinks the water.

(a) What are the actions involved in the process of picking the bottle of water to the mouth? (11 marks)

- ***Eyes send impulses to the brain***
- ***Brain interprets the impulses***
- ***Brain sends impulses to the muscles of the arm***
- ***Muscles of the finger coordinate by contracting and relaxing***
- ***Bottle is held between the fingers***
- ***Muscles of the upper hand coordinate***
- ***biceps muscle contract,***
- ***triceps relax***
- ***at the same time***
- ***hand bends***
- ***at the elbow***
- ***the bottle is moved to the mouth,***

(1 mark @ for all response in correct order/sequence)

(b) Explain why a dog which has lost its senses stops being useful in defending the home? (4 marks)

- ***It fail to detect the stimuli in the environment***
- ***It will not be able to see, smell nor hear,***
- ***It will not be able to bark and alert the presence of an intruder***
- ***It will not be able to run and chase the intruder***

(1 mark @ for any correct response)

12. A family bought a piece of cultivated land on a hilly place.

a) Describe the problem that the soil would experience during a rainy season.
(1 mark)

b) What advice would you give to this family to reduce the problem on their land?
(14 marks)

a) The top soil would be washed away by the running water ;

b)

- ***Terracing the land ; to reduce the speed of run-off water ;***
- ***Mulching ; to cover the top soil ;***
- ***Planting cover crops ; to hold the soil particles together ;***
- ***Contour ploughing ; to maintain the soil at the same height of the slope ;***

- ***Increasing water infiltration ; to reduce volume of running water ;***
- ***Crafting channels ; for water flow through the root system ;***
- ***Creating diversions ; which will channel excess water down the slope along a predetermined path ;***
- ***Create open ditches or drains by digging along the slope at regular intervals ; to reduce volume and speed of running water ;***

(any 7, 1mark for action 1mark for purpose of action)

13. The Ministry of Health in Uganda has a programme on vectors and disease control in communities around Lake Regions. The most recent was on treated nets distribution.

a) i) What is a vector?

Is an organism that carry disease causing organisms (pathogen) from one organism to another (host to host)

(1 mark)

ii) Suggest the aim of the above programme by the ministry of health.

To prevent spread of malaria in the communities around lake regions **(1 mark)**

b) Suggest to the communities any other ways that can be carried out to achieve the aim of the programme named in (a)(ii) above. (13 marks)

Breaking the life cycle of the vector ;

- ***Pour used motor vehicles oils onto the pool of water around the homes;***
- ***Breeding small fish in swamps this will feed on larva and pupa of mosquitoes;***
- ***Regular spraying the house with insecticides in order to kill the adult insects;***

Removing breeding places of the vector ;

- ***Removing pools of stagnant water that provide breeding area for the mosquito***
- ***Not hanging clothes on the walls or in the corners of the rooms which provide resting / hiding places for mosquitoes ;***
- ***Slashing bushes around the homes, destroying the resting places of mosquitoes;***

Avoiding mosquito bites ;

- ***Closing windows and doors early in the evenings denying mosquitoes chances of entering the house;***
- ***use of mosquito repellant when outdoors during night / evenings;***
- ***Wearing long sleeve shirts and dresses on hand and trousers to limit bites from mosquitoes;***

Eliminating the parasite ;

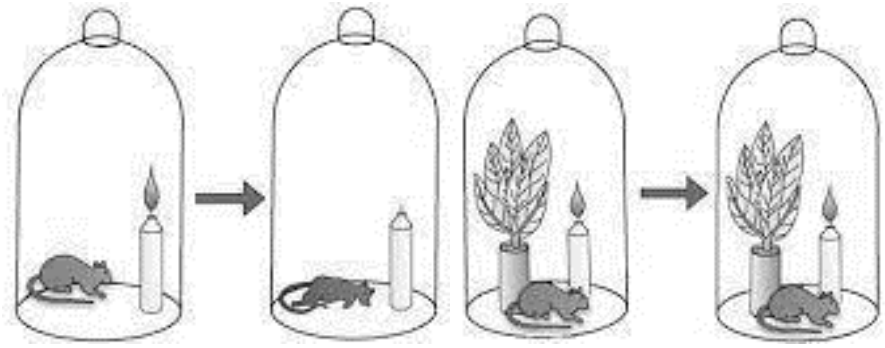
- ***Regular checkup / visit to hospitals and getting treatments to kill the parasites in the body***

(any 11, 1 mrk @, if learner states prevention/control method and/ or it's reason)

14. The diagram below shows an experiment that was conducted by a scientist called Joseph Priestly in

1772. In this experiment, it was assumed that heat had no effect on the organisms.

Experiment setup A Experiment setup B



At start of the experiment After some hours rat is dead At start of the experiment After some hours rat is still alive

a) Describe and explain what happened in both experiment set A and B
(13 marks)

Setup A:

<u>At start of experiment</u>

- ***Rat is alive and candle is burning ;***
- ***Using oxygen ;***

<u>At end of experiment</u>

- ***Rat is dead and Candle stopped burning ;***
- ***Because there was no supply of oxygen ;***
- ***and accumulation of carbon dioxide gas ;***

Setup B

At start of experiment ;

- ***Rat is alive, candle is burning And plant is alive ;***
- ***Mouse and candle use oxygen ;***
- ***And produce carbon dioxide ;***
- ***The plant carried out photosynthesis ; using light and carbon dioxide ;***
- ***and produced oxygen gas ;***

- ***there is removal of carbon dioxide ;***
- ***and replacement of oxygen ;***
- ***So the candle remained burning ;***
- ***and plant and mouse remained alive ;***

(1mark @)

(Scores for description and explantion before and after the experiment for each set up)

b) What logical conclusion do make from the observation from set A and B?
(2marks)

There is interdependence ; between living things and their environment ; for survival

15. A community in Uganda, is cutting down trees in a nearby forest to create new space for farming because food yields from the land they are currently using has declined. A government authority has stopped them from clearing the forest. The community members see no reason why they should be stopped.

a) What general term or phrase would be used to refer to what the community is doing to the forest? (1mark)

b) Write an essay to the community which will make them to appreciate the government's action and how they can stay on their current land. (14 marks)

a) Deforestation/environment degradation/ forest degradation/destruction of the environment/forest depletion;

b)

<u>Importance of forests:</u>

- ***Home/habitat for wild life***
- ***Source of fuel and building materials***
- ***Source of income to government through tourism***
- ***Rain formation***
- ***Wind breakers to protect our houses from destruction by strong winds***
- ***Source of food like honey and wild fruits***
- ***Source of herbs for medicine***
- ***Reserves variety of plant species***
- ***Purifies the air /removes carbon dioxide from the air/ adds oxygen gas to the air***

(Any correct 4, 4 marks)

<u>How to use forests positively:</u>

Forests should not be cut down but resources can be got from the forests by

- ***Selectively cutting a particular tree for a good reason like building so that the young are left to mature***
- ***Removing only dead dry branches for fire wood so that the tree can live to continue supplying fuel***
- ***Picking a few leaves or flowers or cutting pieces of bark for medicine so that the plant species are maintained***

(Any correct 2, 2 marks)

<u>Maintaining soil fertility:</u>

- ***Poor food yields from the current land space is due to bad farming practices which have led to loss of soil fertility***
- ***With good farming practices the land will regain its fertility and produce good yields***

(2 marks)

<u>Good farming practices:</u>

- ***Mulching reduces water loss by evaporation and removal of top soil by erosion. When the plant material rot, they add humus.***
- ***Crop rotation to avoid exhaustion of a single soil mineral nutrient***
- ***Inter cropping /Mixed farming- to spreads nutrient drain and reduces soil stress.***
- ***Addition of organic manure to replace depleted mineral salts to restore soil fertility***
- ***Proper use of selected artificial fertilizers to replace depleted mineral salts to restore soil fertility***
- ***Weeding reduces removal of good mineral salts by unprofitable plant***
- ***Use of selective weed killers so that the desired crops are not destroyed***
- ***Avoiding overgrazing reduces exposure of soil and therefore reduces soil erosion.***
- ***Reduction of soil erosion reduces loss of top soil and its mineral nutrients, hence, maintaining soil fertility.***

(Any correct 6, 6 marks)

16. 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?

b) What challenges are faced by the teenagers from the talk?

c) Suggest way forward to help the teenagers.

a*)*

- ***The girl being pregnant***
- ***They are a disgrace to society and their family***
- ***They are sick/ she is HIV positive***
- ***Too young to get married***

(any 3, 1 mark @)

b)

- ***Uncertainty of the future***

- *Fear of being sent away from the family*
- *Fear of being rejected by bthe community*
- *Likely to drop out of school*
- *The boy is likely to infected*
- *Boy becoming father at an early age*
- *Lack support to sustain the situation*
- *The girl being pregnant at an early age*
- *Girl fears boy might abandon her*

(any 6, 1mark@)

c)

- *Girl should not abort*
- *Go for further counselling*
- *Get constant medical attention*
- *Boy go for testing*
- *Seek support from the parents*
- *Boy continue with studies*
- *Girl after delivery goes bavck to school*
- *Abstain from sex until they are of age and ready for children*
- *Both apologise to their parents and the society*

(any 6, 1mark@)

END

4.3 Sample Practical Paper

Biology
Paper 2
Sample paper
2 hours 15 Minutes

LOGO

UGANDA NATIONAL EXAMINATIONS BOARD
Uganda Certificate of Lower Secondary Education
Biology

Paper 2 (Practical Paper)
2 hours 15 minutes

CANDIDATE NAME: _____

CANDIDATE NUMBER: _____
CENTRE NUMBER: _____

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.

Qn	1	2	Total
Max marks	30	30	60
Actual marks			

Instructions

- This paper consists of two questions. Attempt both questions
- Answers to questions in this paper must be written on separate booklets provided. All questions in carry equal marks.
- Candidates are advised to spend part of the time planning their investigations

1. A hotel rejected a farmer's green vegetables commonly known as dodo (amaranthus) because the leaves and stems were flappy and weak due to loss of water. If the plants tissues have enough water the vegetables remain health. To keep the vegetables fresh, the farmer will have to keep the vegetables in either water or salty water.

a) Design and carry out an experiment to determine of the two: salty water and pure water which one would keep the vegetables turgid and health.
Your experiment planning should include the following aspects:

i. Aim of experiment.
ii. Hypothesis.
iii. Variables
iv. List of apparatus and materials used
v. Procedure
vi. Presentation of data.
vii. Conclusion.

Explain your hypothesis

2. The organisms O, P, Q and R provided were collected from the environment. How would you identify each of the organisms using biological pricnciples?
O – Housefly
P – Cockroach
Q- Tick
R – Termite

END

4.4 Sample Marking Guide for Practical Paper

SAMPLE MARKING GUIDE
BIOLOGY PAPER 2 (PRACTICAL)

1. A hotel rejected a farmer's green vegetables commonly known as dodo (amaranthus) because the leaves and stems were flappy and weak due to loss of water. If the plants tissues have enough water the vegetables remain healthy. To keep the vegetables fresh, the farmer will have to keep the vegetables in either water or salty water.

a) Design and carry out an experiment to determine of the two: salty water and pure water which one would keep the vegetables turgid and healthy. **(30 marks)**

Title indicating variables (2 marks)
Aim of experiment (2 marks)
Hypothesis indicating both variables (2 marks)
Variables (2 marks)
List of apparatus and materials used (2 marks)
Procedure (8 marks)
Presentation of data (6 marks)
Conclusion. (2 marks)

Explanation of hypothesis (4 marks)

2. The organisms O, P, Q and R provided were collected from the environment. How would you identify each of the organisms using biological principles? **(30 marks)**

*Table/ list of characteristics for each organism (**Total – 17 marks**)*

- *Any four characteristics for each organism (1 marks @) – (16 mks)*
- *Presentation of work in tabular form (1 mark)*

*Dichotomous key **(Total - 13 marks)***

- *Three sets of duplets (9 marks) (3 marks @ duplet)*
- *Correctly identified organism (4 marks) (1 mark @)*