



MERRYLAND HIGH SCHOOLS ENTEBBE, BIOLOGY SEMINAR QUESTIONS

ELEMENT OF CONSTRUCT 1

Diversity of organisms & sustainability of natural resources.

The learner Appreciates diversity of organisms & sustainability of natural resources [diversify of organisms, soil, pollution & conservation]

Topics and sub topics to be examined include

- Introduction to biology
- Classification
- Cell biology
- Viruses
- Insects
- Flowering plants
- Ecology; Concept of ecology, Food webs & food chains, Community interactions, Human & natural environment
- Soil

Success criteria

The learner explains/describes challenges/problems/effects of destroying the ecosystem give solutions/advice to such challenges and identifies benefits of the ecosystem to the community and to the environment its self.

Set on Number 4 or 5 in the question paper

Item 1

In Uganda, the beautiful landscapes are home to diverse ecosystems that provide vital natural resources. However, increasing human activity, such as illegal poaching and deforestation for agricultural purposes, has begun to take a toll on these precious environments. The beautiful forests of Bwindi Impenetrable National Park, a UNESCO World Heritage Site, are known for their rich biodiversity, including endangered species like the mountain gorilla. Nonetheless, the pressures of land reclamation for farming and unsustainable logging practices have led to significant ecological disruption.

Task.

Explain the effects of such human activities highlighting the natural resources at risk of being affected and what can be done to reverse the effects. Discuss the benefits of preserving such a UNESCO World Heritage Site emphasizing the importance of biodiversity and ecosystem health. **(HAM SENIOR SECONDARY SCHOOLS)**

Item 2

In a village in Kalungu District, the town residents were complaining of having no market for fish that they had caught in the river. An investor decided to construct a manufacturing factory on the River Banks to provide market for the fish and also get more products from the fish. Fishermen are now complaining about reduced fish, increased cases of respiratory diseases among others.

TASK.

Explain to the locals the challenges the factory may be imposing to life in the lake, advice them on the ways to minimise the effects of the challenges and Show them the value of conserving such a natural resource. **(MERRYLAND HIGH SCHOOL KATABI CAMPUS)**

Item 3

In Lukaya Town Council, swamps have been cleared for Agriculture, cattle farmlands and sand mining. The town residents are dumping wastes in sewage channels, burning rubbish and polythene and are not concerned of the effects they are causing. The Mayor Mr. Jozin and the town clerk Mrs Joy have sensitized the mass about the dangers of such practices but all in Vain. In a recent radio talk show, Mr. Jozin quoted and said "the Earth has enough resources for our need, but not for our greed. Conserving the environment is a state of harmony between men and Land."

Task.

Explain to the town residents the environmental problems likely addressed by the town Mayor and the town Clerk. and how they can be solved. Explain why the village should conserve the natural resources in the swamps **(MERRYLAND HIGH SCHOOL KIGUNGU CAMPUS)**

Item 4

Many residents had cleared and constructed residential and commercial buildings and various factories in Lubigi, a large wetland in Kampala. Due to the many environmental challenges brought about by their actions, the National Environmental Management Authority NEMA, has decided to force them out of the area and destroyed all their buildings in order to restore the wetlands and residents are not happy.

Task.

Explain to the residents how their actions have brought about the environmental challenges in Kampala city. Suggest what could be done to avoid such challenges if they were allowed to sustainably live in the area and why is it important for NEMA, to restore the area to its original state. **(VICTORIAN HIGH SCHOOL)**

ELEMENT OF CONSTRUCT 2

Plant biology (botany).

The learner Understand how plants obtain and use nutrients to meet their requirements during which raw materials and products carried to and from various organs involved.

Topics and subtopics examined here.

- Nutrition in plants
- Transport in plants
- Respiration in plants
- Growth & development in plants

Success criteria.

The learner applies knowledge of plant biology to explain how plants use processes in different organs and structures to over come challenges experienced.

Set on Number 1 in the question paper

Item 5

Jonah planted maize and mixed beans on his plot along a dusty road side. As a way of obtaining good yields, prepared his garden well and planted quality seeds in closely packed columns and rows, applied fertilizers, sprayed to prevent any pests and removed weeds. He planted maize earlier and planted beans later after the maize were already tall. His maize yielded poorly and beans remained stunted with no yields. He is very worried about the out comes yet he spent a lot of money on the garden.

Task.

- a. Describe the causes of the outcomes.
- b. Advice Jonah on how he can plant the same plants in the same garden in other seasons with minimal losses. **(MERRYLAND HIGH SCHOOL KATABI CAMPUS)**

Item 6

Nancy and Catrine who are farmers in Kamu sub county both planted the same type of beans. Nancy planted her beans near the dusty road while Catrine planted her beans far away from the road. At flowering stage the garden was invaded by numerous bees for some time. After the visit by the bees, the bean pods started forming and finally the beans gave some yields. At the harvest time Nancy's yields were to low while Catrine's harvest were relatively higher this left the two confused as they were unable to understand the cause of the differences in the yields.

Task:

- a) Explain
 - i. the major challenges faced by the bean plants in Nancy's garden.

- ii. the internal processes that took place in the bean plants from the time bees visited until when the yields were realized.
- b. How did the beans overcome the prevailing conditions to give some yields?
(MERRYLAND HIGH SCHOOL KIGUNGU CAMPUS)

Item 7

In the village of Kigungu located in Entebbe, local farmers predominantly cultivate Bananas and Cassava. However, the village recently faced a prolonged dry spell followed by strong winds which brought a significant amount of dust that settled on the leaves and stems of banana and cassava crops. The farmers are worried that if this problem persists, it could lead to severe losses in their harvests.

Task:

- a) Identify the life processes affected in the plants.
- b) Explain
 - i. how the functioning of these plants is affected.
 - ii. solutions that the farmers of Kigungu could implement to overcome the challenges posed by dust on their crops. **(MERRYLAND HIGH SCHOOL KATABI CAMPUS)**

Item 8

Mr. Matovu is a farmer in Kigungu Village. He borrowed money from PDM and used it to plant his beans on a full acre of land in hopes of making profits and paying back the loan. A few weeks later, the beans had sprouted and formed their first foliage leaves that came out of the ground. A few weeks after sprouting, the leaves developed yellowish patches, and some were being eaten by the caterpillars. Matovu's friend Jonah felt bad for his friend and gave him a pesticide to eradicate the pests that later all died after being sprayed. Unfortunately, the leaves remained yellowish and the bean plants showed retarded growth. And at the end of the season some bean pods were formed and other plants never yielded anything.

Task.

- a. Identify
 - i. the life processes that were affected within the plant.
 - ii. Other possible measures Mr. Matovu can put in place to prevent such tragedies from happening again next season.
- b. Describe the events that occurred within the seeds from the time they were planted to when the first foliage leaves were formed. **(HAM SENIOR SECONDARY SCHOOLS)**

Item 9

Ddembe of recent bought a piece of land. He planted maize and ground nuts at the onset of the rainy season. After some time, the plants were showing stunted growth, having yellow small leaves, while some leaves had fallen off prematurely. On investigation, he found out that plants had very short poorly developed roots. On consultation from the agriculturalist, he was given a chemical which he mixed with water and sprayed on the crops. After two weeks, the plants had improved with many broad long leaves, many long roots and started flowering. Ddembe is very happy

Task;

- a) Identify the plant nutrients that were likely to be present in the chemical
- b) i. Explain how the above-named nutrients led to the increase in plant yields.
ii. How did the plants overcome the challenges during growth? **(MERRYLAND
HIGHSCHOOL KIGUNGU)**

ELEMENT OF CONSTRUCT 3

Animal biology (zoology).

The learner Understands how mammals (animals) obtain & use nutrients to meet their energy requirements during which raw materials and products are carried to & from different organs involved.

Topics and subtopics examined.

- | | |
|-------------------------------|-----------------------------------|
| • Nutrition in animals | • Excretion in animals |
| • Transport in animals | • Growth & development in animals |
| • Respiration in animals | |
| • Gaseous exchange in animals | |

Success criteria

The learner explains/describes roles of structures/processes/concepts involved and explains or describes the symptoms/causes/effects of disorders/problems

Set on Number 6 or 7 in the question paper

Item 10

Mr. Zinart is an athlete who loves jogging and working out everyday in the morning hours. He recently shifted from his former town X due to having been employed in a different town Y. Town Y is characterised by numerous manufacturing industries that produce numerous pollutants like toxic fumes, smoke and dust that was minimal in town X.

He used to jog everyday without any complications in town X but unfortunately when he shifted to town Y, he experienced complications such as difficulty in breathing, chest pain and coughing.

Task:

Explain to Mr. Zinart his experiences while living in town X and the new ones encountered in town Y and advise Mr. Zinart on how to manage the challenges experienced in town Y.

(HAM SENIOR SECONDARY SCHOOLS)

Item 11

Jonah experienced a fatal accident where he experienced teeth loss and loss of consciousness. He was rushed to the near by hospital and on further diagnosis, it was seen that his pancreas was damaged. The doctor advised that Jonah should undergo blood transfusion immediately in addition to other medication. The hospital did not have blood but Jonah's relatives were willing to donate blood so as to save his life. They consulted the Doctor to see who would be able to donate. On analysis, Jonah's cousin aged 20 years and weight of 60Kg was of blood group A, Jonah's mother aged 46 years and with a weight of 70Kg was of Blood group B, Jonah's sister aged 20 years with a weight of 38Kg was of blood group AB and Jonah's Brother was of blood group O aged 9 years with a weight of 29Kg.

Task

- a. Identify
 - i. the organs of Jonah's body that were affected
 - ii. With clear reasons, to the family who can possibly donate blood to Jonah since he was tested Being blood group AB
- b. Explain how the damage of the organs affected the normal functioning of his body.

(MERRYLAND HIGH SCHOOL KATABI)

Item 12

Galvina was always sick and initially resisted seeking medical attention because she is very stubborn but eventually realized the negative impact her deteriorating health was having on her life. When she was eventually taken to the hospital, reported symptoms of frequent urination, lower abdominal pain, Haematuria (Blood in urine), fatigue, Nausea, Vomiting, swollen feet and ankles. When her Urine was tested, it had a lot of proteins. An examination also revealed difficulty in standing and alcohol on her breath.

TASK.

- a. Identify the organs which were affected by the patients' symptoms
- b. Identify the role this(these) organ(s) play(s) in the body.
- c. Describe the events that led to the formation of the urine that was taken to the lab for testing.
- d. Suggest strategies for managing the condition she is suffering from.

(MERRYLAND HIGH SCHOOL KIGUNGU)

Item 13

Your School Health Team are conducting a study in which they checked on the health status of students. During the study, they measure and record the weight, age and height of the students. When asked by students why they were doing so, they replied "We want to know your BMI Status". They also had with them a chart as seen below.

BMI (kg/m ²)	Interpretation
<18.5	Under weight
18.5-24.9	Normal
25-29.9	Over weight
≥30	Obese
30-34.9	Class 1 obese
35-39.9	Class 11 obese
≥40	Class 111 obese

The results some students in S.2 include;

Name	Age (years)	Height(Cm)	Weight (g)
Judith	14	165	64000
Charles	15	162	45000
Peace	15	156	69000

Task.

- a. i. Why is it important to know your BMI?
- ii. Calculate the BMI of the above three students. Comment on their BMI

Status.

- b. State three implications of being;
 - i) Underweight
 - ii) Overweight
- c. How can you advise a student who is;
 - i) Underweight
 - ii) Overweight (**MERRYLAND HIGHSCHOOL KATABI**)

Item 14.

Gembe, a village in Luwero is composed of the following groups of people; Pregnant women, Crawling babies, footballers and athletes, office workers and old people. The health care providers of the area want to design the right diet for each group of people but they don't know what to include. You have been consulted on what to do.

Task.

- a. Identify the nutrients and their uses that should constitute a greater percentage in the diets of the above groups of people in Gembe village.
- b. Suggest what would happen if the individuals above depended on an imbalanced diet.

ELEMENT OF CONSTRUCT 4

Human physiology.

The learner Appreciates how a human body coordinates various activities and adjust to ensure normal functioning of body systems.

Topics and sub topics examined.

- *Coordination*
- *Homeostasis*
- *Osmoregulation*
- *Locomotion*

Success criteria

The learner explains/describes how a human body coordinates various activities and adjust to ensure normal functioning of body systems.

Set on Number 2 in the question paper

Item 15

Frank is a teenager who is in S4. He drinks alcohol and uses other related drugs to feel high. On several encounters, his parents have been counselling him to stay away from drugs. One day as he was boiling milk. He rushed to lift the saucepan that had milk as the milk was about to spill. Even after lifting the hot saucepan, without any insulator, he never felt pain. His grand mother got surprised. After putting the saucepan down, Frank experienced pain and rushed to put his hands in water to cool down.

Task.

- a. Explain
 - i. the challenges Frank is likely to face as a teenager.
 - ii. Explain the reasons behind his failure to respond to the heat stimuli in the scenario.
- b. What advice can you give to Frank and other teenagers so as to be productive members of society. **(ENTEBBE COMPREHENSIVE SENIOR SECONDARY SCHOOL)**

Item 16

Arthur smokes cigarettes, Marijuana, cocaine and shisha everyday after work with his friends. During weekends he consumes alot of alcohol. He nolonger has enough money to pay school fees for his children who are appearing malnourished. He beats his wife every time and the wife is in plans of divorcing him. Arthur recently has developed hypertension and diabetes plus other chest problems affecting his breathing rate. He appears weak and other and older than his real age.

Task

- a. Explain the effect of Arthurs life style on

- i. Him self.
- ii. His family.
- b. Explain how Arthurs Situation can be solved. **(VICTORIAN HIGH SCHOOL)**

Item 17

Kelly is a student in S4 who frequently urinates and feels thirsty. One day while on his way back home, he heard a very loud barking sound from a fierce dog. When he tried to run, his legs felt weak and he couldn't move them. When he forced himself to move he instead fell down. His heart pounded, eyes protruded and his heart beat increased

Task

- a) Explain how Kelly's body coordinated from the time the loud barking sound was heard to the time he wanted to run a way.
- b) Point out
 - i. his bodily metabolic disorder and explain its causes
 - ii. Ways how he can manage his health condition. **(MERRYLAND HIGH SCHOOL KATABI CAMPUS)**

Item 18

Peter is preparing a meal while enjoying a few drinks with friends. After several hours of socializing and consuming alcohol, he decides to warm some milk for his evening tea. As he reaches for the saucepan on the stove, he accidentally touches the side of the hot pan. He doesn't react in anyway but realises later that he got a burn in the process.

Task:

- a) Explain
 - i. The key processes and body parts involved in that incidence, including the roles of sensory receptors, nerves, and the spinal cord.
 - ii. The biological problems that arise from Peter's alcohol consumption
- c. Describe
 - i. how the body normally overcomes such challenges through reflex actions
 - ii. Describe potential strategies or interventions that Peter could take to minimize the risks associated with alcohol consumption in dangerous situations like cooking. **(MERRYLAND HIGH SCHOOL KIGUNGU CAMPUS)**

Item 19

Nanyonga, a senior three student normally watches films at the nearby trading centre up to midnight. On her way back home, she saw a fierce looking dog coming towards her.

Immediately, she experienced an increase in the rate of heartbeat and breathing. She picked a stick and beat the dog.

Task

- a. Describe how her body coordinated from the time she saw the dog up to when her arm muscles helped her to beat the dog.
 - b. What are the possible
 - i. Effects of the student's way of life as described in the scenario above?
 - ii. Ways through which the student can be helped to change her lifestyle?
- (HAM SENIRO SECONDARY SCHOOLS)**

ELEMENT OF CONSTRUCT 5

Inheritance of characters and their variation.

The learner Appreciates how traits are inherited in organisms, passed to generations through reproduction and are manifested as organisms grow.

Topics and subtopics examined include

- Genetics [inheritance & variation]
- Cell division
- Reproduction
- Growth & development

Success criteria

The learner explains/describes/ demonstrates how traits are inherited in organisms, passed to generations through reproduction and are manifested as organisms grow.

Set on Number 3 in the question paper

Item 20

In a certain family, a paternity dispute has arisen between a man, Mr. Kasozi, and a woman, Mrs. Kasozi, over their 2-year-old child. Mr. Kabuye denies being the biological father of the child since they have different blood groups while Mrs. Kasozi claims he is the right father. The child's blood type is O, Mrs. Kasozi's blood type is B while Mr. Kasozi's blood type is A. Recently, the child was diagnosed with a bleeder's disease after an injury, where he even needed a blood transfusion but neither of the parents had such a disorder.

Task.

- a) Clearly show to Mr. Kasozi the possibility of being the father of their 2-year-old child basing on the scientific facts of blood groups.
 - b) What are the likely effects of the disease discovered in the 2-year-old?
- (MERRYLAND HIGH SCHOOL KATABI CAMPUS)**

Item 21

Musa was a man of Honor, with a very good job, lived in Munyonyo where he had constructed a very big house where he married and stayed with his new bride. Two years ago Musa's wife got pregnant and gave birth to a son with a very low birth weight, the child experiences pain in his joints, that are always swollen. A medical examination revealed a damaged spleen and low blood count. Musa has sold most of his things to treat his child and feels like God has abandoned him. Musa started living in a grass thatched house in Bwaise with his wife where their son eventually died from leaving them devastated. A year ago, Musa's Wife got pregnant again and experienced a miscarriage. And since then all subsequent pregnancies have been miscarried. Musa is depressed and has sworn to commit suicide. A medical examination revealed a rhesus blood incompatibility causing the miscarriage

Task.

- a. Explain.
 - i. The disorder their person son had.
 - ii. Using a genetic cross how their son got to have such a disorder.
- b. Suggest
 - i. An explanation for the possible causes of the miscarriage and why their first pregnancy never got miscarried.
 - ii. Which advice you can give to Musa so as to deal with the problems his family is facing. **(MERRYLAND HIGH SCHOOL KIGUNGU CAMPUS)**

Item 22

In a recent case in Kigungu, a 16 year old Isabella, influenced by her peers, innocently engaged in sexual acts with several boys and became pregnant with a baby girl. After her baby's birth, it was discovered that the baby has a hereditary disease of excessive bleeding when injured. As news spread, two families were implicated, and Isabella's family sought to identify the baby's biological father to understand potential hereditary risks and ensure proper support.

Task:

- a.
 - i. Using a genetic cross, identify explain how the rightful biological father can be identified.
 - ii. Describe the processes that lead to the pregnancy.
- b. Which advice can you give to Isabella and her peers about the dangers of early pregnancy. **(MERRYLAND HIGH SCHOOL KIGUNGU)**

Item 23

A woman has a daughter. There are three men whom she claims might have been the father of the child. The judge in the paternity court orders that all three men, the child, and the mother have blood tests. The results are:

Mother, Type A
Daughter, Type O
Man 1, Type AB
Man 2, Type B
Man 3, Type O.

The mother claims that this proves that Man 3 must be the little girl's father. The judge isn't satisfied, so he asks for the medical records of the people involved. He discovers that the little girl is colourblind. Men 1 and 2 are also colourblind; Man 3 has normal colour vision, as does the mother.

Task.

Using your knowledge of Genetics, work out the crosses and determine the rightful biological father of the child. (VICTORIAN HIGH SCHOOL)

Item 24

Milly was 15 years old and in S3, when she was convinced by David to engage in a sexual activity. After one month, she discovered that she was pregnant and decided to go to David for support but David denied being responsible and abandoned her. She later started falling sick more often and on testing she had Hepatitis B and Malaria. She delivered the baby who was mentally retarded, has a short neck, bulging eyes and flat face. The doctor said that the child's mental condition is due to a genetic disorder caused by non disjunction.

Task.

- a. Explain
 - i. how the child's genetic condition comes about.
 - ii. What are the likely challenges that Milly faced before and after delivery
- b. Suggest
 - i. How Milly can ensure that the child lives a healthy life
 - ii. Advice you would give to teenagers outside to prevent what Milly is Passing through. (HAM SENIOR SECONDARY SCHOOL)

Biology practical paper 553/2/3

Item 1

After weaning her baby, Akumu introduced her to a new diet. Six months later the baby developed a pot belly, bleeding gums, started falling sick frequently. The neighbors suggested that Akumu should add some other foods to the baby's diet to improve the baby's condition. Food samples in solutions **P**, **Q**, **R** and **S** are some common in Akumu's environment.

Task

Carryout a scientific investigation on all the food samples and then use your results to advise Akumu on which ones to be added to the baby's diet. **(your investigation should include aim, hypothesis, variables, materials, results of experiment, analysis and recommendation)**

Item 2.

Nakabito a chips seller in Wandegeya market noticed that most people enjoy eating Irish potatoes in sliced fried form. She cuts them into small pieces and allows them to settle in water for some time in preparation for frying them. Nakabito's customers enjoy the chips and even pack some for their children home. In a rush to serve her customers, she bought 2 jerry cans of water to use the next day and soaked the sliced Irish potatoes in them. The next morning the sliced pieces were fried and served to the customers but noticed that they were different from the normal ones always served since they were small in size. Nakabito is afraid of marking losses.

Solutions **Q** and **R** are samples from the two jerry cans and plant organ **M** is similar to what Nakabito uses in her business.

Task

Carry out a scientific investigation on solution **Q** and **R** with plant organ **M** to so as to help Nakabito save her business.

Item 3

Rice grows well in swampy areas. A farmer bought two different plots of land in the same area to grow rice on large scale. plot **A** is on a slightly raised area while plot **B** is located at the valley. He planted the same quantity of rice seedlings on both areas **A** and **B**. The farmer observed that the roots of many rice plants from plot **A** had short roots and a few had long roots while those of plot **B** all had many short roots. At harvest time the yield from plot **B** was more than from plot **A**. The farmer was told that the difference in yield was due to difference in the soils' ability to retain water. The famer wants to know why the two plots have different yields.

Task

You are provided with soil samples **A** and **B** obtained from the two plots. Design and Carryout a scientific investigation on soil samples **A** and **B** to determine which plot of

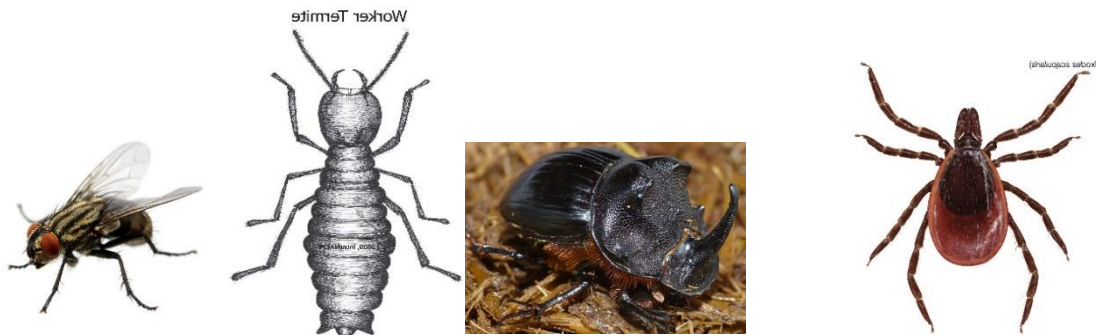
land would give the farmer better yields. Use your results to explain the difference in yields of the farmer.

Element of construct 2;

Appreciates the structure and function in living things

Item 4

Pastoralists around Nakaseke district have often complained about unknown organisms on their animals. Many of their animals keep rubbing their bodies on tree trunks in order to get rid of the organisms. When the pastoralists reported to the district veterinary officer, he collected the specimen from the affected cattle corridor and took them for further analysis in the laboratory. Specimen P(tick) Q (worker termite) R(housefly) and S (beetle) are some of the organisms collected.



Task

- With reasons, classify the specimen into two common taxa.
- Explain how specimen P is adapted to causing its effect on the animals.
- Identify the specimen using a dichotomous key
- Draw the specimen that is responsible for the effect on the animals. Label the main body parts.

Item 5

Mr. Opio and Mr. Okello are neighboring farmers in Kigombya village in Mukono. When flowering time reached, their flowers matured. Mr. Opio observed that more bees visited Mr. Okello's garden than his. Mr. Okello continuously complained of decreased yield in his garden.

You have been provided with specimen K (maize inflorescence) from Mr. Opio's garden and L (hibiscus flower) from Mr. Okello's garden.



Task

Using observable features

- a) Identify the specimen provided.
- b) Explain why more bees preferred Mr. Okello's garden
- c) Draw and label the female part of specimen L.

~END~

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"SUCCESS IN YOUR FINAL EXAMS"