

UGANDA CERTIFICATE OF EDUCATION
BIOLOGY (553/1)

1. PLANT BIOLOGY (Element of Construct 2)

Item 1

In a botanical garden, observations were made about a seed-bearing plant whose flowers were always picked by herbalists due to its medicinal properties. They also usually shred off its bark and dug out its roots to prepare medicinal extracts. Although such plant trees die off in the long run, they usually develop scar-like structures around their shred stems, numerous apical buds and nodes after the herbalists' activity.

Task:

Explain how:

- (a) the herbalists affected the functioning of the plant trees in the long run.
- (b) the plant trees managed to survive after the herbalists' activity

Item 2

Herbalists in Buikwe District use Mabira forest as a source of their herbal medicines. They debark trees, harvest leaves and dig out tree roots in order to extract various herbal medicines for several ailments. Consequently, the medicinal plant species in the forest are decreasing greatly.

Task:

- (a) Identify the several plant structures affected by the activities of the Herbalists.
- (b) How do the actions of the Herbalists affect the normal functioning of medicinal trees in the forest?
- (c) Explain how the medicinal plant trees are able to survive despite the actions of the herbalists.

Item 3

During a dry season, a farmer planted bean seeds in his prepared garden. Three weeks later, he observed that most seeds did not germinate, and those that did, the plants had yellow leaves, weak stems and poorly developed roots. The beans became stunted.

When the rains returned, the bean leaves became greener, stems elongated and became taut and more roots were formed. The beans gave yields.

Task:

Explain how:

- (a) the processes in the bean seeds and plants were affected by the conditions in the garden.
- (b) the beans overcame the conditions to give yields when the rains returned

Item 4

Mr. Kagoro prepared his garden well and planted beans which were looking healthy for the first three weeks. Suddenly, a dry spell set in and most beans had their leaves turning yellow, and some wilted. At flowering stage though, 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.

Task:

- (a) Identify the major challenges faced by the bean plants in Mr. Kagoro's garden.
- (b) Explain the internal processes that took place in the bean plants from the time bees visited until when the yields were realized.
- (c) How did the beans overcome the prevailing conditions to give some yields?

Item 5

Mr. Mubiru prepared his garden well and planted beans which were looking healthy for the first three weeks. Suddenly, a dry spell set in and most beans had their leaves turning yellow, and some wilted. At flowering stage though, 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.

Task:

- (a) Identify the major challenges faced by the bean plants in Mr. Mubiru's garden.
- (b) Explain the internal processes that took place in the bean plants from the time bees visited until when the yields were realized.
- (c) How did the beans overcome the prevailing conditions to give some yields?

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 too low while Catrine's harvest were relatively higher, leaving 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?

Item 7

Two farmers A and B planted equal acreage of maize in the same season. Farmer A's garden is near an extremely dusty and busy murram road, while farmer B's garden is very far away from the road. The maize in both gardens showed different growth rates, despite being under similar weather conditions and soil profile. The garden for farmer B was invaded by caterpillars at flowering stage; however, the maize managed to give yields before that of farmer A.

Task:

- (a) Point out the major processes and organs affected by the prevailing conditions in the gardens of the two farmers.
- (b) Explain how the conditions in the garden of farmer A were responsible for the delayed yields.
- (c) How did the maize in the garden of farmer B finally manage to give yields despite all challenges?

Item 8

Jonah planted maize and mixed beans on his plot along a dusty road side. As a way of obtaining good yields, he 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 outcomes yet he spent a lot of money on the garden.

Task:

- (a) Describe the causes of the outcomes.
- (b) Advise Jonah on how he can plant the same plants in the same garden in other seasons with minimal losses.

Item 9

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.

Item 10

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 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.

Item 11

Ddembe recently 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?

Item 12

An Irish potato farmer in a swampy area had his garden flooded for a long time during prolonged rains experienced in the area. He made the following observations about his garden during the season:

- The leaves of the potato plants turned yellow.
- The potato plants became stunted with weak stems.
- Some potato plants wilted; others had rotten roots.

When the rains reduced and the flooding was no more, the Irish potato plants revived, having greener leaves, upright stems and numerous roots. The plants managed to produce Irish potatoes for the farmer.

Task:

- (a) Explain the observations made by the farmer during the rainy season.
- (b) How did the potato plants finally manage to produce Irish potatoes for the farmer?

Item 13

Mr. Kadimba, a farmer in Mityana district, intercropped beans within a mature Banana plantation. When the beans were flowering and bananas bearing fruits, the area experienced a heavy hail storm that left the entire garden destroyed. Many bean flowers, leaves and stems were broken to the ground and some banana plants were even uprooted. Mr. Kadimba did not harvest any beans. Two months later, he observed that the remaining banana plants developed an extensive root system, produced numerous suckers with broad green leaves and straight stems. The banana plantation was restored.

Task:

Explain how:

- (a) the hail storm affected the beans leading to no harvest that season.
- (b) the banana plantation was restored two months after the hail storm.

Item 14

A farmer planted crops in a well prepared garden. Before flowering, the plants were attacked by some insect larvae which destroyed most of the young leaves, terminal buds and the outer layer of the stems. The farmer noticed that the plants had become stunted as they were not growing at the expected rate.

After some time, the larvae disappeared and the plants resumed growing, produced many branches, leaves, flowers and fruits to the surprise of the farmer. At the time of harvest, the farmer was able to get some yields.

Task:

- (a) Explain the effects of the insect larvae on the plants.
- (b) Explain how the plants managed to behave the way they did when the insect larvae disappeared.

2. ECOLOGY, ENVIRONMENT & CONSERVATION (Element of Construct 1)

Item 15

In an open grassland, a farmer established a commercial maize plantation where he grows maize throughout the year. He burns down the garden after harvest and uses tractors to plough the land in preparation for planting. He applies commercial fertilizers heavily in a bid to have good yields. He also uses selective herbicides and insecticides to control weeds and insect vectors respectively. He always gets good yields.

Task:

- (a) Explain how the farmer's practices may affect the grassland environment where he established the commercial plantation.
- (b) Advise the farmer on how to minimize the dangers caused in the environment through the farming practices

Item 16

In a hilly area with scattered trees, farmers constantly dig up and down the hill to grow crops, cut down the trees for charcoal, are engaged in brick laying and often graze large herds of their cattle

on the hill. During heavy rains, the area faces mudslides and flooding in the valleys. Residents attribute these to the activities happening on the hills.

Task:

- (a) Show how the farmers' activities have resulted in the challenges faced during heavy rains.
- (b) Point out the benefits of conserving such areas.

Item 17

Mr. Mukasa cleared a forest along the slopes of a hill that had fertile soils to extend his farm for growing maize. After several years of planting maize on his farm, the maize plants planted started to grow slowly with yellow leaves which greatly reduced the maize yields. Yields are poorer at the hill top than in the valley. Also, residents of this village use the valley of Mr. Mukasa's farm for dumping plastic waste bottles and used polythene bags which has caused more challenges especially in the streams found in the valley.

Task:

Explain the likely effects of the actions of Mr. Mukasa and the residents of his village and suggest possible ways these effects can be overcome. What is the importance of conservation of valleys?

Item 18

Mr. Mukasa cleared a forest along the slopes of a hill that had fertile soils to extend his farm for growing maize. For several years of growing maize on his farm, he applies artificial fertilizers and uses herbicides for weeding the maize farm. After harvesting, he burns down the garden to clear it for next season before ploughing using tractors.

Task:

- (a) Explain the dangers of Mr. Mukasa's farming practices to the environment.
- (b) How can the environment be sustainably utilized by Mr. Mukasa without much damage?

Item 19

A chemical factory was established on a large river bank, with a view that it needs constant supply of water for its machinery and activities. Overtime, the river developed a lot of algal blooms, and the fishermen complained of dwindling numbers of fish species previously caught in large numbers. It was also noted that during the establishment of the factory, a lot of soil was heaped along the river bank, and so a lot of deposition goes on into the river. Environmentalists have warned the government about pending dangers especially during rainy seasons.

Task:

Explain to the relevant authorities the origin of the problems, show how they can be worked upon and sensitize them on the relevancy of the natural interactions that go on in such communities.

Item 20

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, advise them on the ways to minimise the effects of the challenges and show them the value of conserving such a natural resource.

Item 21

In order to promote tourism in Murchison Falls National Park, the Uganda Wild Life Authority decided to increase the number of lions, and these were transferred from Queen Elizabeth National Park to the area. The lion population in Murchison Falls National Park grew bigger, and coincidentally, the numbers of antelopes decreased drastically. With time, the park increasingly became bushy and the game wardens decided to use fire to control the bushes. During periods of burning, thick smoke covered the atmosphere for the greater part of the day. The National Wildlife body is now concerned over the challenges in the national park.

Task:

Explain to the relevant authorities the origin of the problems in Murchison Falls National Park, show how they can be worked upon and sensitize them on the relevancy of the natural interactions that go on in such communities.

Item 22

Developing countries depend heavily on fossil fuels to run their agricultural activities like fuelling tractors, harvester machines and most motor vehicles. The machines used in agriculture are said to affect soil properties leading to reduced productivity while fuels are associated with causing death of organisms, global warming, climate change and other environmental issues. To reduce the above effects, Uganda banned importing of cars older than 15 years. Despite experts explaining that these cars have old technology that leads to increased release of pollutants like greenhouse gases and smoke, most car dealers believe the government wants to put them out of business.

Task:

- (a) Explain to the car dealers how their cars contribute to the environmental issues talked about in the scenario.
- (b) Suggest environmentally friendly alternatives that can be used to reduce dependency on the above fuels that are considered harmful to the environment.

Item 23

40 years ago, Banda was a natural swamp with numerous papyrus plants, reptile species and several birds. Over time, people started constructing homes within the wetland until it became a township. However, residents still face a number of challenges both during wet and dry seasons and all these are attributed to the fact that the natural swamp is no longer in existence.

Task:

Explain the problems in Banda, suggest how the residents can overcome them, and show them the value of conserving the natural environment.

Item 24

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 it is important for NEMA to restore the area to its original state.

Item 25

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.

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.

Item 26

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.

Item 27

Residents of a village near a National Park depend mainly on wood fuel and food from the Park. Water from the village swamps flows into the river that runs through the National Park. The residents always wash their clothes, relax and swim in the river and the swamps.

The Park authority made observations about some animals as shown in Table 1.

Table 1

Animal	Number in the year	
	2020	2024
Antelope	3,990	2,000
Hyena	102	62
Lion	69	120

(The animals live naturally in the Park without any artificial control of their numbers and there is no migration.)

Data from the local health centre indicates that most homes in the village lack pit latrines or toilets. There are also increased cases of snake bites, sleeping sickness and bilharzia.

Task:

- (a) Explain the observations from:
 - (i) the park authority.
 - (ii) local health centre.
- (b) Explain measures the residents should take to reduce the challenges reported at the health centre.

Item 28 — Ilodo Village Swamp and Factory

Residents of Ilodo village used to dump their domestic wastes in the nearby Ilodo swamp. The fresh vegetation of the swamp together with the dumped wastes allowed interactions of different living things.

An investor filled part of the swamp with murram (red soil) and constructed a factory. The factory directs its wastes into the stream in the swamp. The residents and the entire natural community of organisms no longer enjoy the benefits of the swamp.

Task:

- (a) Explain how the investor's actions denied the environment and the residents the benefits they used to get from the swamp.
- (b) Suggest the importance of conserving such areas described in the scenario.

3: HUMAN PHYSIOLOGY . (Element of Construct 4)

Item 29

Jane, a P.5 pupil in a day school, feels hungry often and urinates frequently. This disturbed her learning. One day as she was moving to school early in the morning, she saw a fierce dog heading towards her. Her eyes protruded, heart beat increased and she sweated profusely. She decided to run but her legs were too weak to support her so she fell down.

Task:

- (a) Explain how Jane's body:
 - (i) coordinated to bring about her reaction(s) after the fierce dog.
 - (ii) is affected by the condition that is disturbing her learning.
- (b) Suggest how Jane can manage the condition that is disturbing her learning

Item 30

Adrian, a S.4 teenager in one of the urban schools, frequently urinates and feels thirsty. One day while seated in class, he heard a very loud sound of a tear gas canister from the scuffle between the police and a demonstrating mob in town. His heart pounded, eyes protruded and his heart beat increased. He stood out to go and hide, but his legs were too weak to support him, so he fell down and his friends laughed at him.

Task:

- (a) Explain how Adrian's body coordinated from the time the loud sound was produced by the tear gas canister until he fell down while trying to run and hide.
- (b) Point out his bodily metabolic disorder and explain its causes.
- (c) Show Adrian how he can manage his health condition.

Item 31

Mary, a P.6 pupil, frequently urinates and feels hungry often especially after eating sweet things. Despite being a short girl in class, she sits behind, since she experiences eye strain while copying work when seated very near the chalk board on the front seats of the classroom. These two health conditions have affected her study and the parents are looking for solutions.

Task:

- (a) Identify the health conditions present in Mary and explain how each one comes about.
- (b) Explain to Mary's parents how they can manage the health conditions present in their daughter

Item 32

Moses is a tall boy, who is bright in class. As a result of his friends, he started taking alcohol and marijuana which prompted him to always escape from school. One day as the class Teacher was

organising the class, Moses refused to sit at the back, stating that he cannot see clearly on the chalk board when at the back of the class, so he insisted on sitting on the first row of the class.

Task:

- (a) Explain Moses' problem to the teacher that is making him insist on sitting on the first row of the class, clearly pointing out its cause.
- (b) State the likely effects of Moses' lifestyle.
- (c) Advise Moses on how he can improve his lifestyle and be a good child.

Item 33

David, a S.3 boy, has been sitting at the back of the classroom. However, he complains of not seeing clearly the writings and drawings on the chalk board, so the teacher changed his position to the first front row of the class despite being taller than other learners. One day during a school routine inspection, David was found with a sachet of waragi and a packet of cigarette. He was sent out of school.

Task:

- (a) Explain:
 - (i) why David complained of not seeing clearly from his position in class.
 - (ii) the effects of the items found with him during school inspection to his life.
- (b) Show how David can overcome the challenges in his life.

Item 34

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 away.
- (b) Point out:
 - (i) his bodily metabolic disorder and explain its causes.
 - (ii) Ways how he can manage his health condition.

Item 35

Anna, a teenager, recently joined a peer group of boys who smoke marijuana, and frequently watch films at the cinema hall in trading centers late into the night. One night, as Anna was walking back home, she encountered a fierce dog barking loudly and running towards her. Her heart rate and breathing rate increased, eyes protruded, she tried running but her legs were too weak to support her and so she fell down.

Task:

- (a) Explain:
 - (i) the likely effects of Anna's new lifestyle on her life.
 - (ii) how her body coordinated to bring about her reaction after encountering a fierce dog on her way back home.
- (b) What advise can you give to Anna to avoid the challenges associated with her new lifestyle

Item 36

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.

Item 37

A grandmother instructed her grandson to watch over a saucepan of milk on fire until it boils. At boiling, the old woman rushed to lift the saucepan, but in the event, she immediately released it, slipped off and fractured her leg in addition to burns and scalds sustained. When rushed to the hospital, the orthopedic doctor diagnosed her with Osteoporosis.

Task:

- (a) Explain:
 - (i) The effects of the grandmother's health condition as stated by the doctor.
 - (ii) How her reaction after lifting the hot saucepan came about.
- (b) Advise the grandmother on how she can manage and improve her health condition as stated by the doctor.

Item 38

A 60-year-old woman who was a smoker complained of persistent joint pains and backache that made her walk with difficulty. She could not easily read the small words of the Bible as she used to. Her children took her for medical examination in a hospital.

During medical examination, as the doctor flashed torch light in her eyes, she kept blinking. On further examination, the doctor noted that she had a problem with her eye lens, and the distance between the cornea and retina was shorter than expected. She also had weak bones.

Task:

- (a):
 - (i) Explain why the old woman could not easily read the small words in her Bible.
 - (ii) Describe how the response by the old woman's eyes to the doctor's medical examination was brought about.
- (b) Advise the old woman on how she can manage the health condition that made her walk with difficulty.

Item 39

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 grandmother 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) 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?

Item 40

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 any way 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.
- (b) Describe:
 - (i) how the body normally overcomes such challenges through reflex actions.
 - (ii) potential strategies or interventions that Peter could take to minimise the risks associated with alcohol consumption in dangerous situations like cooking.

Item 41

Arthur smokes cigarettes, marijuana, cocaine and shisha everyday after work with his friends. During weekends he consumes a lot of alcohol. He no longer 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 older than his real age.

Task:

- (a) Explain the effect of Arthur's lifestyle on:
 - (i) himself.
 - (ii) his family.
- (b) Explain how Arthur's situation can be solved.

4.ANIMAL BIOLOGY — NUTRITION, TRANSPORT & RESPIRATION (Element of Construct 3)

Topics: Nutrition, Transport, Respiration, Gaseous Exchange, Excretion, Growth & Development in Animals

Item 42

During his first hospital visit in January, Oloya, a five-year-old boy was found to be having wasted muscles, not physically active, had wounds on his legs and was generally weak. Special foods majorly comprising of Lato milk, millet porridge and fruits were recommended by the Nutritionist for Oloya. His condition has since then improved and data from the hospital records about his weight is as shown in the tables below.

Month	Weight (kg)
January	10.9
March	11.8
May	13.5
July	14.8
September	15.7

The normal weight range of boys is shown in **Table 2**

Table 2: shows normal weight range of boys between 2 to 7 years

Age (years)	Weight (kg)
2	8.9 – 15.1
3	11.9 – 17.9
4	13.4 – 20.4
5	15.2 – 24.4
6	16.9 – 26.5
7	18.6 – 31.5

Task:

Clearly point out Oloya's health challenges and explain how his body utilized the special foods to enable him improve his health.

Item 43

David's 3-year-old son was attacked by sickness that resulted in the breathing difficulties, high body temperature, vomiting and sores in the mouth. The baby was rushed to the hospital and after some treatment, the breathing normalized and the vomiting ceased. The doctors advised that although the baby was still anaemic, the most appropriate treatment is proper diet that can enable the baby fully recover.

Task:

- (a) Explain how the sickness affected the normal functioning of the baby's body.
- (b) Suggest an appropriate diet with reasons which will enable the baby to recover as per the doctor's advice.

Item 44

Jayden, a 3-year old boy of blood group B was weaned at 2 years. Since weaning, he has been feeding majorly on rice and cassava.

Whenever he gets injured, he always takes long to get healed. Jayden's medical records indicate that he frequently suffers from infections and cough. He also has reddish hair and scaly skin. Due to these conditions, his mother prefers to keep him indoors especially in the morning and only brings him out after 11:00 a.m. when the day is warm.

Jayden became so weak and the mother took him to hospital. At the hospital, it was also noted that he passes out an abnormally small volume of yellow urine, was severely anaemic and with weak bones. Jayden was recommended for a blood transfusion but the only safe blood available in the hospital was of group A. The mother wondered why the hospital could not carry out transfusion using the available blood.

Task:

- (a):
 - (i) Explain the causes of Jayden's health condition.

- (ii) Suggest what can be done to improve Jayden's health condition without taking him to hospital.
- (b) Explain to Jayden's mother why the available blood could not be given to Jayden.

Item 45

After a morning heavy carbohydrate meal, Nagenda, a male athlete started to warm up in preparation for the competition in long races. He competed favorably, but towards the end, he developed muscle cramps and was breathing heavily. Nonetheless he endured and finally won the race. After finishing, his heavy breathing continued, while the muscle cramp progressively receded. He even managed to walk back home from where he took another meal.

Task:

Explain how Nagenda's body utilized the morning meal to enable him win the competition, analyze the challenges his body encountered during the race and how it overcame them to enable him walk back home.

Item 46

Mr. Kaggwa took a cup of porridge before going for his routine exercises in the gym. He started exercising with vigor but later felt muscle pain and fatigue. He decided to sit down but continued to experience rapid breathing and feeling hot which later stopped and the pain also disappeared. He took a glass of juice, and went back home.

Task:

- (a):
 - (i) Describe how the porridge enabled Mr. Kaggwa carry out his exercises in the gym.
 - (ii) Explain the challenges his body experienced during the exercise.
- (b) How did his body handle the challenges to enable him go back home

Item 47

A long serving public servant lives a sedentary lifestyle characterized by smoking, sitting in office for long hours and eating a lot of fatty foods. In the long run, he has developed swollen feet, coughs blood and has been diagnosed with cardio-vascular disease and poor oxygen loading by his red blood cells.

Task:

- (a) Justify the poor health observed in the public servant in relation to his lifestyle.
- (b) Advise the public servant on how to improve his health.

Item 48

A 42-year old school bursar enjoys a lot of fatty foods and sugary drinks and also sits for long hours in office. He smokes one packet of cigarettes a day. He experiences swelling of his feet and his teeth have turned brown. Lately, he experienced shortness of breath and general body weakness and was taken to the hospital for medical check-up. The medical results showed that the school bursar was overweight, had fat deposits in the coronary artery and also had some of his air sacs blocked. He was advised to start medical treatment.

Task:

- (a) Explain how the conditions experienced by the school bursar are as a result of his lifestyle.
- (b) Explain how the school bursar can overcome the conditions in his body besides using medical treatment.

Item 49

Having been in a company of chain smokers for two years, Daniel, a teenager developed dry cough and serious chest pain and got hospitalized after coughing blood. The medical report suggested that Daniel was a smoker, which he utterly denied, and so the doctor put him on serious medication. In the course of the treatment, it was also discovered that Daniel's blood could no longer load enough oxygen, a reason why he was always very weak.

Task:

Mention Daniel's health problem and clearly explain how his body contracted it. Advise Daniel on how he can recover from the problem discovered later in the course of the treatment.

Item 50

Mr. Zinart is an athlete who loves jogging and working out every day 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 every day 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.

Item 51

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, she 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 patient's 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.

Item 52

Jonah experienced a fatal accident where he experienced teeth loss and loss of consciousness. He was rushed to the nearby 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. On analysis, Jonah's cousin aged 20 years and weight of 60 kg was of blood group A; Jonah's mother aged 46 years and weight of 70 kg was of blood group B; Jonah's sister aged 20 years with a weight of 38 kg was of blood group AB; Jonah's brother was of blood group O aged 9 years with a weight of 29 kg.

Task:

- (a) Identify:
 - (i) the organs of Jonah's body that were affected.
 - (ii) With clear reasons, state who among the family 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.

Item 53

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. They want to know the BMI Status.

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

Item 54

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.

CLUSTER 5: GENETICS, REPRODUCTION & INHERITANCE (Element of Construct 5)

Item 55

David got married to Joan and they produced a son. Their son, when injured, bleeds a lot even with a slight cut on the skin and this causes a lot of distress in the family.

When Joan got pregnant for the second time, David advised her to abort on the belief that they would get a child with similar condition as that of their first born son. However, when David and Joan went to the hospital concerning their son's condition, they were told that the condition was a result of Joan being a carrier of a bleeder's disease.

Task:

- (a):
 - (i) Explain why Joan should not take David's advice.
 - (ii) Show how their son inherited the condition.
- (b) What should Joan and David do to manage the challenges associated with the condition of their son?

Item 56

Mary and Peter had been married for 10 years and have produced five girls. Peter is very bitter and blames his wife for denying him boys, so he started engaging in extra-marital affairs. After some time, Peter developed an ailment, went to a health facility, which after some tests were carried out, it was discovered that he was HIV positive.

Task:

- (a) Convince Peter that he is also responsible for the kind of children they have in their marriage.
- (b) Identify the likely symptoms possessed by Peter as a result of his health status.
- (c) How can Peter manage life with his health status?

Item 57

Musa and Sharon have been a happy couple with three healthy boys. When Sharon realized that she was pregnant for a fourth boy, she was very disappointed. She blamed the man for failing to give her a girl, refused to go for antenatal care, started skipping meals, and had thoughts of abortion. This has caused a lot of family distress and Musa is very worried.

Task:

- (a):
 - (i) Using Genetic diagrams, explain to Sharon why she should not lose hope of having a girl child.
 - (ii) Explain the likely consequences of Sharon's decisions.
- (b) Suggest what can be done to help the couple stay healthy and have a safe delivery.

Item 58

A couple living with HIV has had three healthy children. Their fourth born however was born with pale skin, white hair and pink eyes. This worried them, since they were both dark-skinned but the doctors advised them to take care of the baby properly, since it was a genetic condition and so the baby would grow normally as others.

Task:

- (a) Using genetic symbols, show how the condition in their fourth born came about.
- (b) Explain how the couple can:
 - (i) continue living positively with their health status.
 - (ii) take care of their fourth born child.

Item 59

Jane is a thirteen-year-old P.6 pupil who was discovered to be pregnant at school during the routine pregnancy checks. She was sent out of school and her parents decided to keep her at home until she delivers. In the course of the pregnancy, she faced many challenges and did not go for antenatal care. She finally delivered her girl child, though with a lot of difficulty. After about one year, her child presented frequent fevers, had sharp pains in the body and was generally weak. The medical personnel informed Jane that her child had a genetic condition that was responsible for her health. Jane and her boyfriend did not believe the personnel's information since for them they had never had such a problem.

Task:

- (a) Help Jane and her boyfriend to believe the medical personnel's information.
- (b) Point out the likely consequences of Jane's decisions and actions responsible for her current state. How can Jane better her life despite prevailing conditions?

Item 60

Jane is a secondary school girl, studying in a day school near her home. As a result of bad peer groups, she started drinking alcohol and dodging school. When the school authority tried to trace why Jane was dodging school, they found out that she had a boyfriend in the nearby village, where she would stay, without reaching school.

A few months later, Jane started feeling sickly and vomiting. When her parents carried out an HCG urine test, it turned out positive and they were very bitter with her.

She was forced to marry her young boyfriend by her parents; however she continued with her habits and did not attend antenatal care.

Task:

- (a) Explain the events that resulted into the changes in Jane's body from the time she met her boyfriend up to when she started feeling sickly and vomiting.
- (b) What are the likely consequences of Jane's lifestyle?
- (c) Advise Jane on how she can improve her living conditions.

Item 61

An NGO was established in a given community which has high cases of teenage pregnancy and related problems. The NGO has two clear mandates to execute in the community. Namely:

1. Sensitize adolescents on reproductive health, with emphasis on menstruation as a landmark process in adolescent girls.
2. Promote awareness on STI especially HIV/AIDS and promote healthy living.

The NGO does its work through meetings with the youths and other groups to sensitize them in line with the mandates above.

Task:

- (a) Provide information to explain how the landmark process in the first mandate of the NGO occurs in adolescent girls.
- (b) What advises can you give to the community adolescents on how to overcome challenges handled by the NGO in line with both mandates?

Item 62

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. Kasozi 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?

Item 63

Musa was a man of honour, 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, 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 first 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.

Item 64

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 and 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?

Item 65

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 colour blind. Men 1 and 2 are also colour blind; 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.

Item 66

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.

Item 67

A farmer grows red and white flowers for sale. One day, a friend told him that pink flowers were more on demand. He was advised to cross-pollinate his pure breeding dominant red flowered plants with pure breeding recessive white flowered plants, which he did. To his surprise, all the flowers were red and none was pink. He is now worried that he has lost his variety of white flowers. He needs your help.

Task:

Using genetic diagrams, explain to the farmer:

- (a) why he did not get pink flowers.
- (b) that he can still get the white flowers in the second generation.

END