

Candidate's Name:Signature:

553/1

BIOLOGY

Paper 1

2024

2½ hours



B.PETER'S ACADEMIC PLATFORM

UGANDA LOWER SECONDARY CERTIFICATE OF EDUCATION

ASSESSMENTS TO CANDIDATES

BIOLOGY PAPER 1

THEORY SENIOR

FOUR

INSTRUCTIONS TO CANDIDATES:

This paper consists of several examination items.

Answer all items for your good academic performance all.



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

SECTION A

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

Item 1.

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

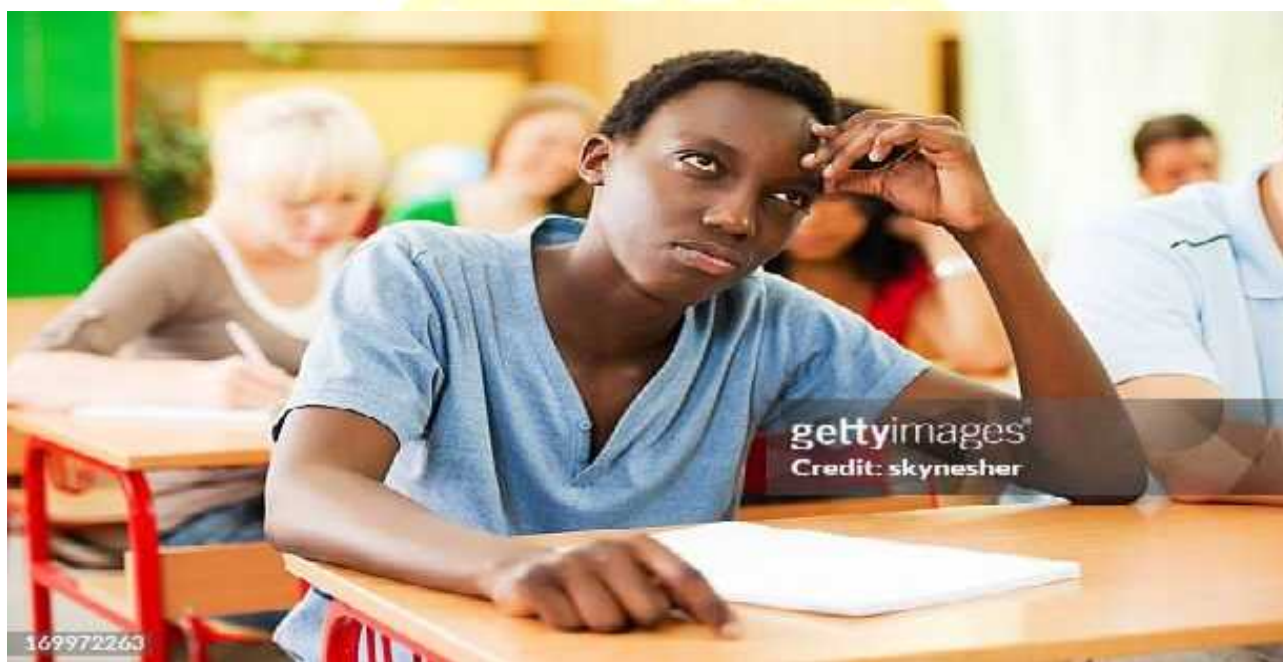


Fig.1 shows Peter confused in the Biology lesson.

Task

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

scores

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

Item 2.

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



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

Task

As a Biology learner;

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

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

Item 3.

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

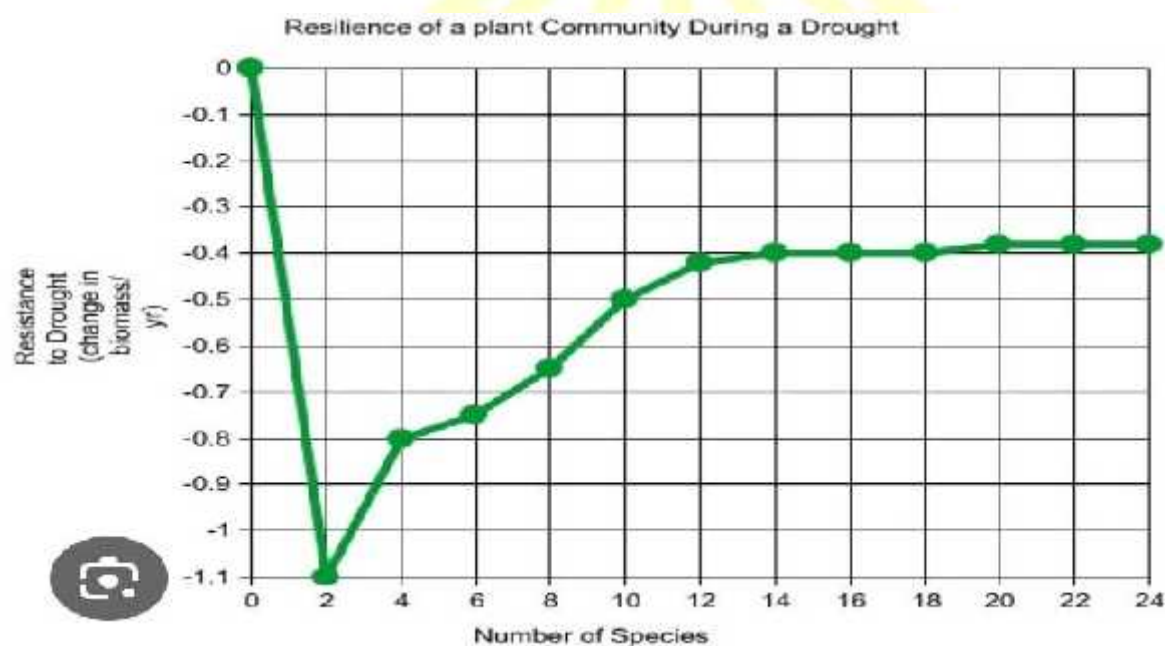


Fig.3 shows Mr.Kyabaggu's graph.

Task

As a Biology literate;

(a). Identify both the dependent and independent variable Mr.Kyabaggu could have considered in his thesis.(02 scores)

(b). Help Mr.Kyabaggu to come up with the description of the shape of his graph.(04 scores)

Item 4.

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

Task

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

Item 5

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

Task

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

Item 6.

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

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

(Extracted from www.mun.ca)

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

Task

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

Item 7.

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

Task

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

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

Item 8

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

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

Item 9

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

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

item 10

In preparation for an inter-house competition, Chesang, a 40 kg female athlete ate a meal containing 470 g of carbohydrates in the morning. She believes the meal will help her perform better during the competition. However, her young brother does not seem to understand how the meal will contribute to Chesang's success. Chesang finally won the competition but experienced muscle cramps. She rested for 20 minutes; returned home walking but the brother wondered how she still had the strength to walk home after the competition.

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

Task

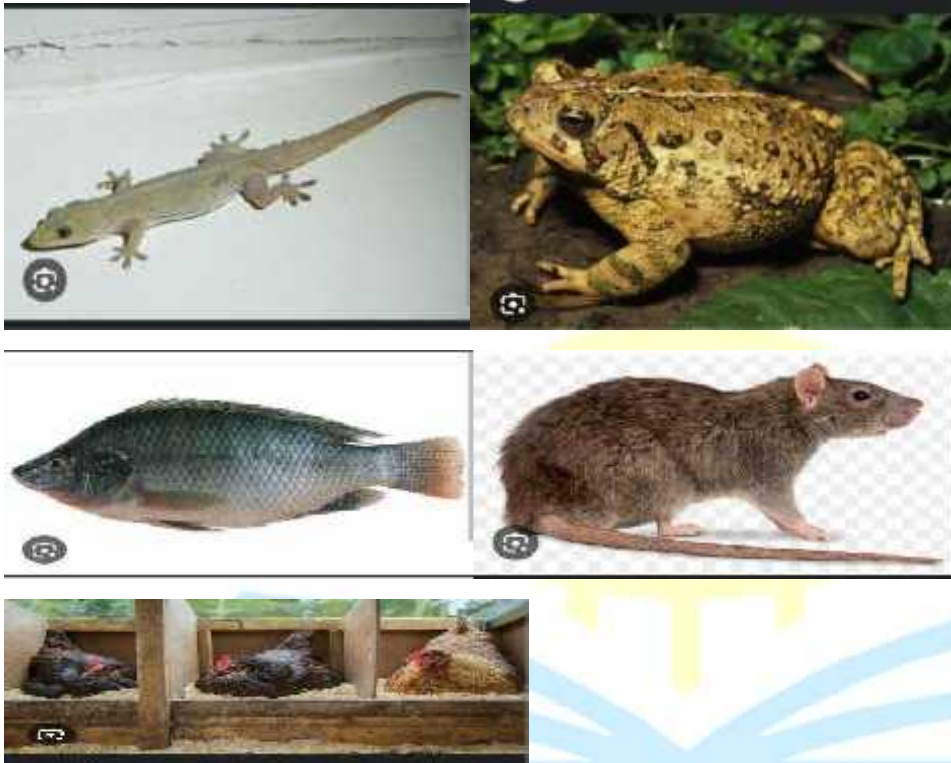
Explain to Chesang's brother the processes that the meal she ate went through to enable her win the race, be able to come back home and how her body regained the normal state (20 scores)

Item 11

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

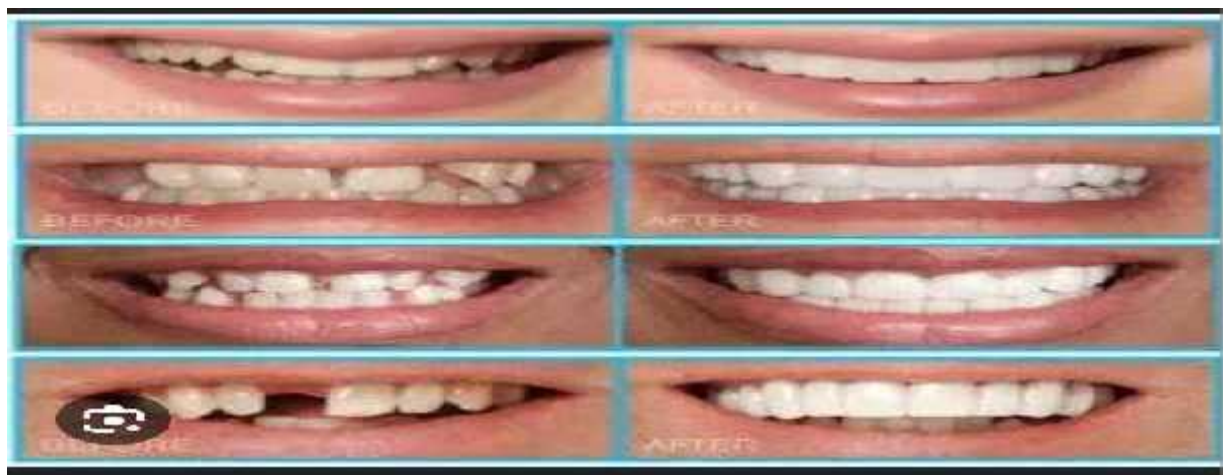
item 12

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



Item 12

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



Task

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

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

Item 13

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





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

Item 14

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



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

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

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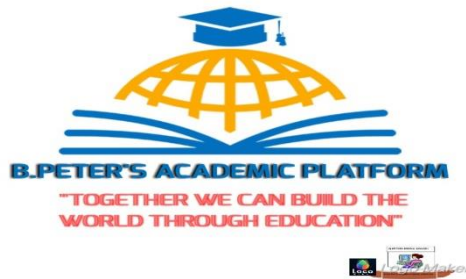
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B.PETER'S ACADEMIC PLATFORM

UGANDA LOWER SECONDARY CERTIFICATE OF EDUCATION

ASSESSEMENTS TO CANDIDATES

SOLUTIONS TO BIOLOGY ITEMS

THEORY

SENIOR FOUR



Item 1

a)

BIOLOGICAL HIERARCHIES	POLITICAL ADMINISTRATION
Kingdom	World
Phylum(phyla)	Continent
Class	Country
order	District
family	Country
Genus(genera)	Sub-county
species	parish

b) Biological hierarchy of man

Kingdom	Animalia
Phylum(phyla)	Chordate
Class	Mammalia
order	Primates
family	Hominidae
Genus(genera)	Homo
species	sapiens

c) Importance of classification

- ✚ It is easy to study organisms in the same group since the members of a specific group resemble
- ✚ It helps the scientists to easily identify organisms belonging to the same group

Item 2

a) The Oestral cycle is a series of physiological changes that occur in a woman's body every month. It is a natural process that prepares the body for a potential pregnancy. The cycle is divided into three phases i.e. menstruation, follicular phase, and luteal phase.

During **menstruation**, the uterine lining is shed, and the body prepares for the new cycle. In the **follicular phase**, the body starts to produce a follicle, which is a small sac that contains an egg. This follicle releases estrogen, which causes the uterine lining to thicken in preparation for a fertilized egg. If the egg is not fertilized, the follicle ruptures, and body releases progesterone, which causes the uterine lining to be shed, result in **menstruation**.

If the egg is fertilized, it is implanted in the uterine lining, and the body starts to produce **progesterone**, which helps to maintain the uterine lining and supports the

development of the **fetus**. If the egg is not fertilized, the body stops producing progesterone, and the uterine lining is shed, resulting in menstruation.

- b) The Oestral cycle involves several hormones, including Estrogen, Progesterone, and Follicle-stimulating hormone (FSH).

Estrogen is produced by the ovaries and is responsible for causing the uterine lining to thicken in preparation for a fertilized egg.

Progesterone is also produced by the ovaries and helps to maintain the uterine lining and supports the development of the fetus if the egg is fertilized.

FSH is produced by the pituitary gland and stimulates the growth of the follicle in the ovary

Understanding the Oestral cycle and the hormones involved can help Rachael and John better understand their bodies and how to plan for a pregnancy. It can also help them identify any potential issues that may be affecting their ability to conceive

Item 3

- a) Dependent variable: resistance to drought of the tree species
Independent variables: number of tree species
- b) To describe the shape of the graph, one could observe the trend of the data points. If the graph shows an increasing trend, it could be described as a positive correlation between the number of the tree species and the resistance to drought.

Conversely, if the graph shows a decreasing trend, it could be described as a negative correlation between the number of tree species and the resistance to drought

Item 4

Sex linkage refers to the inheritance of genes that determine certain physical characteristics such as eyes color, or blood type. These genes are located on the sex chromosomes, which are either X or Y chromosomes.

In humans, female have two X chromosomes (XX), while males have one X and one Y chromosome(XY). This means that genes located on the X chromosome are more likely to be

inherited by both sons and daughters, while genes located on the Y chromosome are likely to be inherited only by sons.

For example, if a mother carries a gene for blue eyes on her X chromosome, all of her daughters will inherit that gene and have blue eyes. However, if the father also carries the gene for blue eyes on his Y chromosome, all of his sons will inherit that gene and also have blue eyes.

Item 6

A cross match table

Donor	Recipient				
	A	B	AB	O	
A	□	X	□	X	Key X ----- Incompatible □ ----- compatible
B	X	□	□	X	
AB	X	X	□	X	
O	□	□	□	□	

Note:

- ✓ Blood group AB can receive blood from all other blood group because it has no antibodies and its is therefore called a universal recipient
- ✓ Blood group O can donate blood to all other blood groups because it has no antigens and therefore its called a universal donor

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