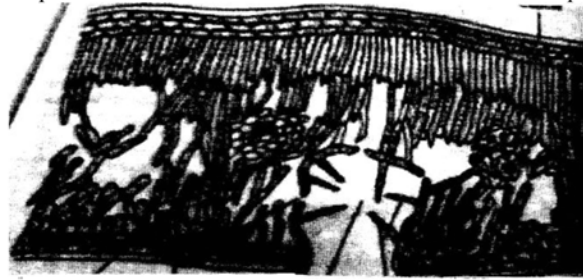
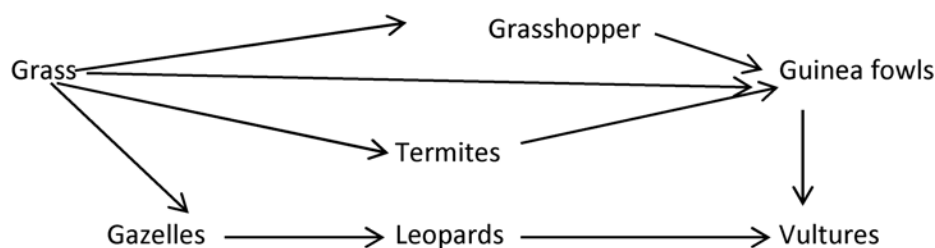


- b) Name the reagent used to test for reducing sugars? (1mk)
14. Explain how the following prevents self-pollination and self-fertilization
- i) Protandry (1mk)
- ii) Self-sterility (1mk)
15. Below is a photograph of a leaf of a plant from a certain habitat. Use it to answer the questions that follows



- a) Name the type of a habitat from which the above plant was obtained (1mk)
- b) State one observable features that support your answer in (a) above (1mk)
- c) How does the named feature in (b) above assist the plant to survive in the habitat? (1 mk)
16. Removal of the apical bud from a shrub results to development of lateral buds that grows to form side branches. Give lessons for the above occurrence. (3mks)
17. Give an example of each of the following in animals.
- i) Analogous structure (1mk)
- ii) Homologous structure (1mk)
- iii) Vestigial structures in human. (1mk)
18. a) Name the branches of Biology that deals with
- i) Study of microscopic organisms (1mk)
- ii) Study of chemical reactions that occurs in cells (1mk)
- b) Give the functions of the following apparatus.
- i) Pit-fall trap (1mk)
- ii) Pair of forceps (1mk)
19. A form one student observing onion epidermal cells under the how power objective lens counted 5 cells on a field of view measuring 5mm.
- a) Estimate the size of one cell (2mks)
- b) If the eye piece magnification used was x10 and that of the objective lens was x10. What was the magnification of the microscope? Show your working (2mks)
- c) Estimate by approximation the number of cells that would be observed if the objective lens magnification was changed to x40 (1mk)
20. Why do plants excrete less waste products compared to animals? (3mks)
21. State the roles of each of the following parts of the human reproductive system
- i) Cowpers glands (1mk)
- ii) Prostate glands (1mk)
- iii) Urethra (2mks)
22. a) How can low blood volume be brought back to normal? (2mks)
- b) Name two sites in the body that where white blood cells are formed (2mks)
23. One plant species was deprived oxygen. It was noted that uptake of sodium ions slowed then stopped.
- a) What process was affected? (1 mk)
- b) Why did the uptake of sodium ions stop? (2 mks)
- c) Other than oxygen, name another factor that affects the process involved above. (1 mk)
24. The figure below represents a feeding relationship in an ecosystem.

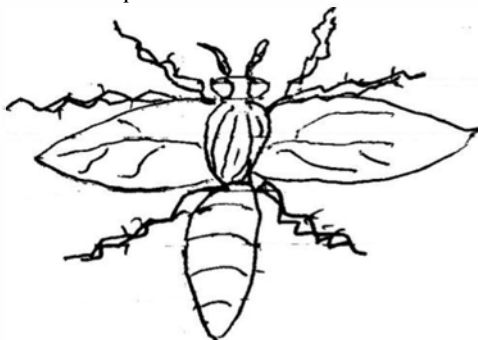


- a) Construct a food chain from the food web where Guinea fowls are secondary consumers. (1 mk)
- b) Sketch a pyramid of biommas from the food chain in a) above. (1 mk)
- c) Explain the change of mass from grass to the other organisms in the pyramid in question b) above. (2 mks)
25. a) Suggest why the ear has three semi-circular canal. (1 mk)
- c) (i) What is the function of cochlea of the ear? (1 mk)
- (ii) Name the part of the eye that corresponds to the cochlea in the ear in it's function. (2 mks)

CEKENAS
FORM 4 END OF TERM 2 2017
EVALUATION EXAM
231/2
BIOLOGY PAPER 2

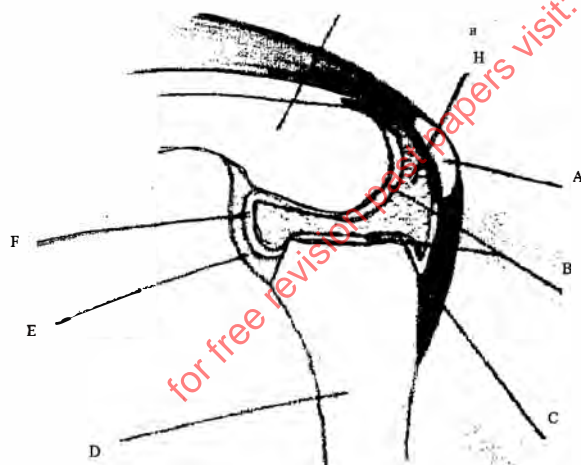
SECTION A

1. Study the diagram Shown below then answer the questions that follow.



- a) State the phylum to which the organism belongs (1mk)
 b) With reason state the class to which the organism belongs (1mk)
 Class (3mks)
 Reason (1mk)
 c) Name two diseases to which the organism is a vector. (2mks)
 d) What type of metamorphosis does the organism show? (1mk)
 2.
 a) What is meant by the term sex-linkage? (2mks)
 b) Name two sex linked traits in humans (2mks)
 c) In *Drosophila Melanogaster*, inheritance of eye colour is sex linked. The gene for red eye is dominant. A cross was made between a homozygous red eyed female and white eyed male. Work out the phenotypic ratio of F₁ generation. (4mks)
 (Use R to represent the gene for red eyes)

3. The diagram below shows the structure of knee joint

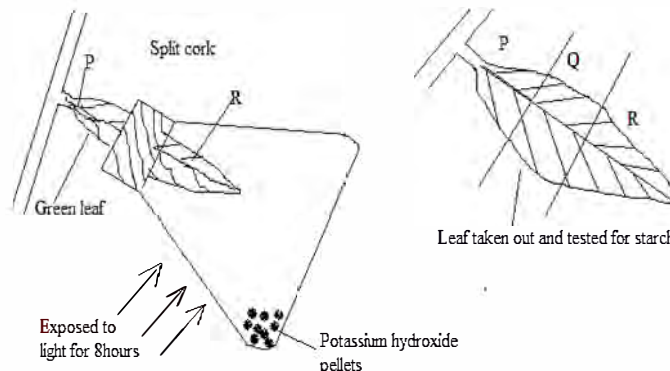


- a) Name the parts labelled (2mks)
 F-
 H-
 b) What are the functions of the above labelled parts (2mks)
 F-
 H-
 c) Name the type of joint found at the structure above, (1mk)
 d) List down three types of skeleton (3mks)
 4. The table below shows the red blood cells counts for a person living at the sea level and the same person after acclimatization at high altitude in preparation for climbing Mount Everest.

	Red blood cells count /dm ³
Sea level	5.0×10^{12}
After acclimatization at high altitude	5.6×10^{12}

- a) Describe how the partial pressure of atmospheric oxygen varies with altitude (2mks)

- b) People who live permanently at high altitude, not only have increased red blood cells counts but also possess other adaptations for life at high altitude. Describe two other adaptations to life at high altitude which might be expected and explain how these adaptations aid their survival. (4mks)
- c) In what form is oxygen transported in the red blood cells? (1mk)
5. The diagram below represents a set up by a student.



- i) State the aim of this experiment? (2mks)
- ii) Why was a separate control experiment not necessary for this experiment? (1mk)
- iii) Account for the observations made in the marked Q and R. (2mks)
- Observations at Q (2mks)
- Observations at R (3mks)

SECTION B (40MKS)

Answer question 6 (compulsory) and either question 7 or 8 in the provided spaces after question 8

6. In an investigation two people A and B drank some amounts of a strong glucose solution. Their blood sugar levels were immediately determined and thereafter at one hour intervals for the next one hour intervals for the next six hours. The results were as shown in the table below.

Time(hrs)		0	1	2	3	4	5	6
Glucose level in mg/100ml of blood	Person A	90	220	160	110	100	100	90
	Person B	110	340	320	300	260	245	215

- a) In the grid provided, plot a graph for the blood glucose level against time for person A and B. (8mks)
- b) In man, the normal blood sugar level is about 90mg/100ml of blood. Explain the change in the sugar level in persons A and B during
- i) The first 4 hrs. (2mks)
- ii) The 6th hr. (1mk)
- c) Suggest a possible reason for the high blood sugar in person B. (2mks)
- ii) How can the high blood sugar in person B be controlled? (1mk)
- d) The pancreas and liver work together in the regulation of glucose in the blood
- i) State the roles of these organs when the concentration of glucose in the blood is below normal. (1mk)
- ii) What would be the effect of removing pancreas from the body? (1mk)
- iii) Distinguish between diabetes mellitus and diabetes insipidus
- 7.
- a) Describe how insect pollinated flowers are adapted to pollination; (11mks)
- b) Describe the role of each of the following hormones in human menstruation cycle (9mks)
- i) Oestrogen hormone
- ii) Progesterone hormone
- iii) Luteinizing hormone
8. Describe the digestion of a meal which contains proteins from time of ingestion to the time the end product gets absorbed. (20mks)

CEKENAS**231/3****FORM 4 END OF TERM 2 EVALUATION EXAM 2017****BIOLOGY PAPER 3****BIOLOGY PAPER III****REQUIREMENTS:**

Specimen M- 6 groundnuts

A mounting pin

A 10ml measuring cylinder

A boiling tube

Thermometer

Means of heating (sharing)

Hand lens

CEKENAS**EVALUATION EXAM****231/3****FORM 4 END OF TERM 2 EVALUATION EXAM 2017****BIOLOGY PAPER 3**

1. You are provided with six specimens labelled M and a mounting pin using the measuring cylinder provided measure the temperature of water and put in a boiling tube. Measure the temperature of the water (initial temperature)
- a) Mount one of the specimen M on the pin and ignite it using a burner flame. Place it under the water. In the boiling tube and let it burn all turns to ash. Measure the new temperature of the water. Repeat the experiment twice and note the readings and record below (3mks)

	Initial temperature (Oc)	Final temperature (Oc)
1 st		
2 nd		
3 rd		

- b) Calculate the average change in temperature. (2mks)
- c) i) If 1cm³ of water requires 4.2J of energy to change through one degree calculate the amount of energy produced by each piece of specimen M. (3mks)
- ii) If an average teenager requires 10400KJ per day, how many pieces of specimen M does one require for the daily energy requirement?
- d) Name two possible sources of error in the above experiment (2mks)
- e) i) Remove outer covering of specimen M. Separate the two halves and observe using a hand lens. Draw and label the two the two halves alongside each other (3mks)
- f) Classify the specimen into its appropriate class and give a reason for your answer (2mks)
2. You are provided with photographs of specimen u,x,y and z



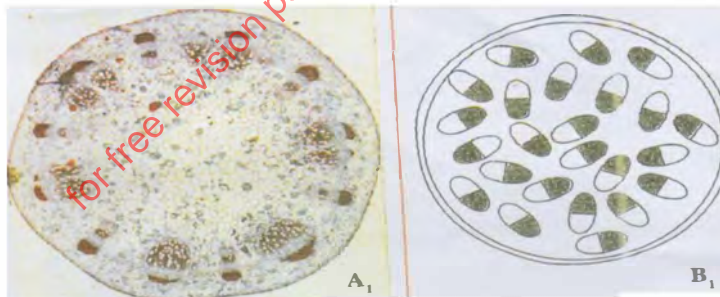
a) Name the bones u_1 , u_4 , u_5 , and z (6mks)

Bone label	Bone identities
U_1	
U_4	
U_5	
X	
Y	
Z	

- b) i) Name the fluid substance found between x_1 and u_1 (1mk)
 ii) State the function of the fluid substance named above (1mk)
 c) Name the structure that joins the bones together at the joint formed between x and y (1mk)
 d) i) State the difference between a hinge joint and the one formed between x_3 and u_2 (2mks)
 ii) State two structure labeled in the photographs that form a ball and socket joint (2mks)
 e) Name the structure at the elbow that performs same functions as the patella (1mk)
 3. Use the photographs below to answer the questions that follow.



- a) Name the sub divisions to which the specimen belongs (1mk)
 b) Name the class to which the specimens belong (2mk)
 c) State three observable differences between the leaves of specimens A and B (3mk)
 d) The diagrams below show the cross sections of stems obtained from specimens A and B



- i) Match the stem cross- section with the specimen (2mks)
 ii) Outline three differences between the two stems (3mks)

Specimen A	Specimen B

- iii) Suggest the agent of pollination of the flowers of specimen A (1mk)
 Give a reason for your answer (1mk)

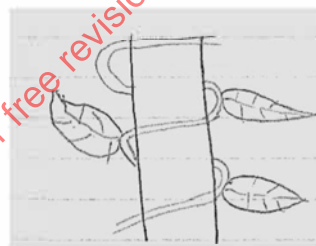
- (c) Name the chemical compound which is formed in the organelle and forms the immediate source of energy. (1mk)
13. (a) Explain why the body temperature of a healthy human being must rise up to 39°C on a humid day. (2mks)
- (b) In an experiment a piece of brain was removed from a rat. It was found that the rat had large fluctuations of body temperatures. Suggest the part of the brain that had been removed. (1mk)
14. (a) State two external features in the class mammalia only. (2mks)
- (b) Name the taxonomic unit that comes immediately after phylum in classification. (1mk)
15. The scientific name of a rat is *RATTUS NORVEGICUS*.
 (i) Write the name correctly. (1mk)
 (ii) Identify the genus and species names. (2mks)
16. State three characteristics of a population. (3mks)
17. Name the causative agent of the following human diseases. (2mks)
 (i) Malaria
 (ii) Syphilis
18. The number and distribution of stomata on three different leaves are shown in the table below.

Leaf	Number of stomata	
	Upper epidermis	Lower epidermis
A	300	0
B	150	200
C	2	13

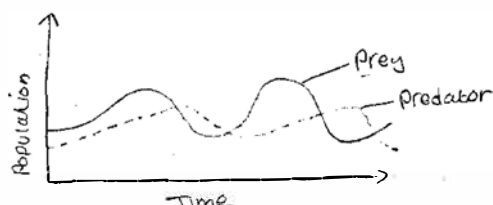
- (a) Suggest the possible habitat of the plants from which the leaves were obtained. (3mks)

Leaf	Habitat
A	
B	
C	

- (b) State the modification found on the stomata of C. (1mk)
19. Name a disorder of human blood which is caused by mutation. (1mk)
20. Define the following terms
 (i) Allele (1mk)
 (ii) Test cross (1mk)
 (iii) Genotype (1mk)
21. What is meant by:
 (i) Organic evolution (1mk)
 (ii) Continental drift (1mk)
22. State the function of each of the following parts of the human ear. (2mks)
 (i) Cochlea
 (ii) Eustachian tube
23. Where in the human body are relay neurons found? (1mk)
24. The figure below shows a stem of a plant growing around a tree trunk.



- (i) What is the name of the response which causes the twisted growth? (1mk)
 (ii) Explain how the twisting process occurs. (2mks)
25. Explain why Lamarck's theory of evolution is not accepted by biologists today. (2mks)
26. Name a supportive tissue in plants thickened with:
 (i) Cellulose (2mks)
 (ii) Lignin
27. State the role of the paired fins of a fish. (1mk)
28. (a) Distinguish between predator and prey. (2mks)
 (b)



The figure above shows predator/prey relationship. Study the figure and answer the questions that follow.

Describe the relationship between the predator and prey.

(2mks)

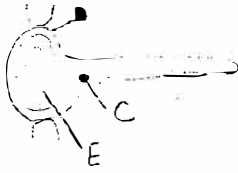
29. List three functional differences between arteries and veins.

(3mks)

30. Distinguish between haemolysis and plasmolysis.

(2mks)

31. The diagram below shows a specialised cell.



(a) (i) Name the cell.

(1mk)

(ii) Name the parts labelled D and E.

(2mks)

(b) State the function of the part labelled C.

(1mk)

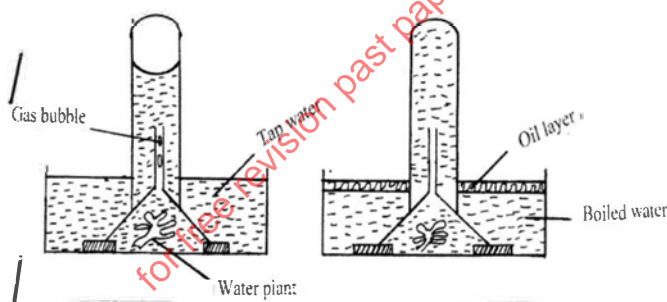
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IMENTI CENTRAL
231/2
BIOLOGY
(THEORY)
JULY 2017
TIME: 2 HOURS

1. In an investigation plants with red flowers were crossed with plants with white flowers. All the plants in the F1 generation had pink flowers. When the F1 plants were selfed, he counted 480 plants in F2 generation.
 - a) Using letter S and H, work out the cross between the F1 plants to get the F2 generation. (4marks)
 - b) Give the phenotypic and genotypic ratios of the F2 generation. (2marks)
 phenotypic ratio:
 genotypic ratio:
 - c) How many plants in the F2 generation had pink flowers? Show your working. (2marks)
2. The table below shows the concentration of some ions in pond water and in the cell sap of an aquatic plant growing in the pond.

Ions	Concentration in pond water(parts per million)	Concentration in cell sap(parts per million)
Sodium	50	30
Potassium	2	150
Calcium	1.5	1
chloride	180	200

- a) Name the process by which the following ions could have been taken up by this plant. (2marks)
 - i) Sodium ions:
 - ii) Potassium ions:
- b) For each processes named in a(i) and a(ii) above, state one condition necessary for the process to take place. (2marks)
- c) What is the role of process named?
 a(i) and a(ii) in plants. (2marks)
- d) What is the role of sodium ions in the human body? (1mark)
- e) Define the term Osmosis. (1mark)
- 3 a) What happens to excess amino acids in the liver of humans. (3marks)
- b) Which portions of the human nephron are only found in the cortex? (3marks)
- c i) What would happen if a person produced less antidiuretic hormone? (1mark)
- ii) What term is given to the condition described in c(i) above? (1mark)
4. Figure 1 and figure 2 below shows two sets of apparatus used by a group of students to investigate a certain physiological process. The apparatus were put in bright light for some time. Some gas bubbles evolved in figure 1 while no change was observed on figure 2.



- a) Name the gas responsible for bubbles in figure 1. (1mark)
- ii) How do you test for the gas produced in a(i) above. (1mark)
- iii) How would we increase the rate of production of the bubbles in figure 1. (1mark)
- b) Account for the formation of bubbles in figure 1 and not in figure 2. (4marks)
5. A fish farmer wanted to know the number of fish in a pond. He collected 10 fish from the pond and labeled each by a tag label on its fin and returned the 10 fish to the pond to mix with other fish. When he later collected 50 fish from the pond, he found only 4 of them had labels.
 - a) Identify the method of estimating population used by the farmer. (1mark)
 - b) Name the apparatus used in capturing fish from the pond. (1mark)
 - c) Estimate the total number of fish in the pond. (Show your working)
 - d) What assumptions were made when estimating the population of fish using this method. (2marks)
 - e) State the limitation of using this method to estimate the population of fish in the pond. (1mark)

6. In a practical lesson, the following data of results was obtained of growth measurement of organisms over a period of 24 days during its development.

Day	Width of head (mm)	Length of hind femur
1	3.0	7.0
3	4.0	8.0
5	4.0	8.0
7	4.0	9.2
9	4.7	12.0
11	5.0	12.0
13	5.0	12.0
15	5.0	12.0
17	5.7	14.8
19	7.0	18.0
21	7.6	18.0
23	7.6	18.0

- a) Using a suitable scale, draw graph of width of head and length of femur against time on the same axis. (7marks)
- b i) Name the growth pattern represented by the graphs. (1mark)
- ii) With reference to the graph, identify the phylum to which the organism belongs. Give a reason. (2marks)
- c) Account for the length of hind femur between;
- i) 3rd and 7th (3marks)
- ii) 7th and 10th day. (3marks)
- d) State two hormones involved in the growth pattern represented above. (2marks)
- e) What is the width of the head and length of femur on the 18th day? (2marks)
- 7 a) Describe the changes in the eye when moving from bright sunlight into a dimly lit room. (10marks)
- b) Describe the process of fertilization in flowering plants. (10marks)
- 8 a) Describe the role of the following hormones in the female reproductive system. (10marks)
- i) Oestrogen
- ii) Progesterone
- iii) Lutenising hormone
- iv) Oxytocin.
- b) Describe how the cervical, lumbar and sacral vertebrae are suited to their functions. (10marks)

**IMENTI CENTRAL
231/3
BIOLOGY PRACTICAL
PAPER 3
FORM 4
JULY/AUGUST 2017**

CONFIDENTIAL INSTRUCTIONS

Each candidate will require the following:

- 5 test tubes in a rack
 - 10ml of solution labelled P₁
 - 10ml of solution labelled P₂
 - 10ml of solution labelled P₃
 - 3 labels
 - 10ml measuring cylinder
- Access to:**
- Benedict's solution fitted with a dropper
 - Iodine solution fitted with a dropper
 - Warm water bath whose temperature should range between 30 – 37°C to be shared by 4 students.
 - Test tube holder
 - Source of heat
 - Means of timing
 - Thermometer

Preparation of solution P₁, P₂ and P₃

Solution P₁

Add 50g of starch in a litre of distilled water. Stir to form homogenous solution. Label it P₁

Solution P₂

Add 5g of enzyme diastase/amylase in 1 litre of distilled water. Stir to form homogenous solution. Label it P₂.

Solution P₃

Prepare another solution P₂. Boil it strongly for 5 minutes and let it cool. Label it solution P₃.

NB: solution P₁, P₂ and P₃ should be prepared in the day of examination.

IMENTI CENTRAL
231/3
BIOLOGY
(PRACTICAL)
JULY 2017
TIME: 1¼ Hours

1. You are issued with solutions labelled P₁, P₂, P₃, benedict's solution and iodine solution. Solution P₃ is similar with P₂ except that it has boiled.

- (a) Use iodine and benedict's solutions to test food substances contained in solution P₁. Record your results in the table below. (4mks)

Food substance	Procedure	Observation	Conclusion

- (b) Label three test tubes X₁, X₂ and X₃. Treat each test tube as follows:

Test tube	Treatment
X ₁	Put 1 ml of solution P ₁
X ₂	Put 1 ml of solution P ₁ and 1 ml of solution P ₂
X ₃	Put 1 ml of solution P ₁ and 1 ml of solution P ₃

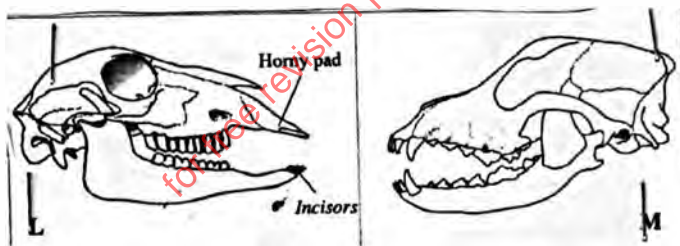
Place the three test tubes in warm water bath whose temperature is maintained between 30°C and 37°C. Leave the setup for 30 minutes.

Test the food substances contained in each test tube by using benedict's solution. Record your results in the table below. (3mks)

Test tube	Observation	Conclusion
X ₁		
X ₂		
X ₃		

- (c) Account for the results at the end of the experiment in test tube labelled X₂ and X₃.

- (i) X₂ (2mks)
(ii) X₃ (2mks)
(d) (i) Suggest the identity of solution P₂. (1mk)
(ii) Give one reason for your answer in d(i) above. (1mk)
(e) What was the role of test tube X₁ during the experiment? (1mk)
(f) (i) Suggest where the process being investigated in this experiment would take place in a mammalian body. (1mk)
(ii) Give a reason for your answer in f(i) above. (1mk)
2. Below are photographs of specimen labelled L and M obtained from different animals. Examine them.



- (a) Suggest the diet of each of the animals whose skulls are shown in the diagram. Give reasons for your answer. (4mks)
(b) Write the dental formula of the animal whose skulls are shown in diagrams L and M. (2mks)
(c) Examine the following diagrams labelled E and F.



With reasons identify E and F.

Identity E

Reasons

Identify F.

(1mk)

(2mks)

(1mk)

3. The diagrams below represent leaves of certain plants.



(a) Use the above diagrams to construct a dichotomous key using the following features and in the order in which they occur. (9mks)

1. Leaf type
2. Venation
3. Margin
4. Number of leaflets
5. Tip of the leaf
6. Leaf arrangement

(b) (i) State the division of specimen F. (1mk)

(ii) Giving a reason identify the class of specimen F. (1mk)

Class

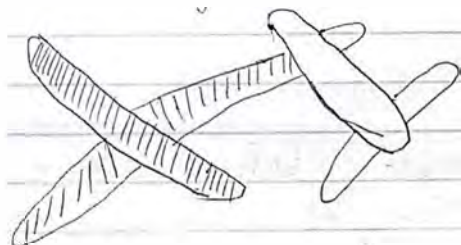
Reason

(1mk)

(1mk)

NYERI CENTRAL
END OF TERM II EXAM 2017
BIOLOGY FORM 4
TIME 2 HOURS
PAPER 1

1. Insect' blood is noted to lack a respiratory pigment.Explain 1mk
2. State the function of the following parts of a nephron.
 - (i) Loop of Henle 1mk
 - (ii) Distal convoluted tubule. 1mk
3. Most terrestrial plants do not grow well in water logged soil. Give a reason for this. 1mk
4. The diagrams below show a pair of homologous chromosomes. Study them and answer the question that follows.

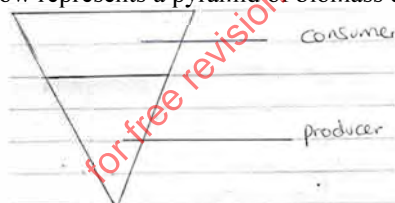


- (i) State the phenomenon shown above. 1mk
- (ii) What is the genetic significance of the phenomenon above? 2mks
5. Give two distinctions of food translocated from the leaves of plants. 2mks
6. Name the organelle that is likely to be found in abundance in
 - (a) An enzyme secreting cell. 1mk
 - (b) Cells producing lipid related secretions. 1mk
 - (c) Areas where the cells have ruptured. 1mk
7. A small boy remarked that his dog looks larger on cold days than on hot days. Give a biological explanation for this. 2mks
8. The table below shows the percentage composition of carbon (iv) oxide and oxygen in inhaled and exhaled air.

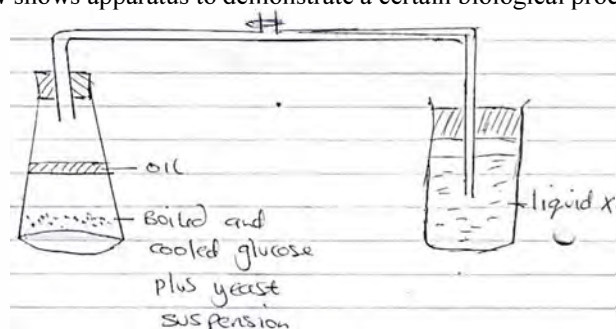
Gases	Inhaled air	Exhaled air
Oxygen	20%	17%
Carbon (iv) oxide	0.04%	4.0%

Explain the differences in percentage of the two gases in inhaled and exhaled air

- (a) Oxygen 2mks
- (b) Carbon (iv) Oxide 2mks
9. The diagram below represents a pyramid of biomass derived from a certain ecosystem

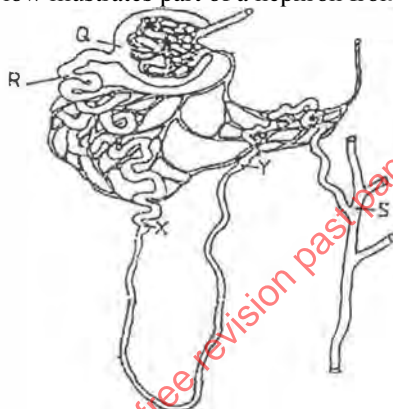


- (a) Suggest the type of ecosystem for which the pyramid was derived. 1mk
- (b) State the significance of short food chains in an ecosystems. 1mk
10. Distinguish precisely between diabetes mellitus and diabetes insipidus. 2mks
11. The set up below shows apparatus to demonstrate a certain biological process.

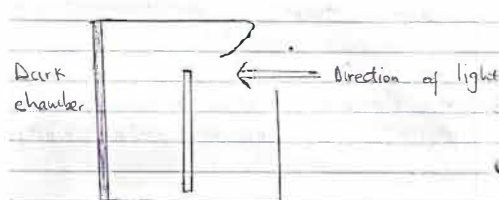


- (a) What biological process was being investigated in the experiment? 1mk
- (b) Write down a word equation that represents the reaction above. 1mk

- (c) In the above set up, why was it important to boil and cool glucose before adding yeast? 1mk
12. Explain how the following occur during gene mutation
- (i) Substitution 2mks
 - (ii) Insertion 2mks
13. (a) What are meristems? 1mk
- (b) (i) What is the role of cork – cambium in secondary growth? 1mk
 - (ii) Name the meristem that is responsible for increase in length of stems. 1mk
14. State two functions of the spleen. 2mks
15. Name the excretory products eliminated by the following animals
- (i) Tilapia 1mk
 - (ii) Chicken 1mk
16. Define
- (a) Pulmonary circulation 1mk
 - (b) Systemic circulation 1mk
17. Name the causative organism of the following diseases. 1mk
- (i) Malaria
 - (ii) Bilharzia
18. Identify the part of light microscope which serves each of the functions described below
- (i) Making rough focus. 1mk
 - (ii) Reflecting light from the source. 1mk
19. State two characteristics of aerenchyma tissue. 2mk
20. What is the significance of transpiration in plants 3mks
21. State two ways in which xylem vessels are adapted to their functions. 2mks
22. Distinguish between convergent and divergent evolution. 1mk
23. State the characteristics that distinguish the following organism into their respective classes. Millipedes, spider and tsetse fly. 3mks
24. How do identical twins and fraternal twins arise?
- (i) Identical twins 2mks
 - (ii) Fraternal twins 2mks
25. The diagram below illustrates part of a nephron from a mammalian kidney

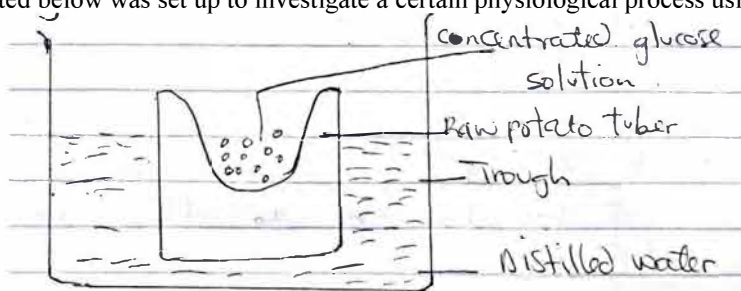


- (a) Name the fluid found in the part labeled Q. 1mk
 - (b) Identify the process responsible for the formation of the fluid named in (a) Above 1mk
 - (c) Which two hormones exert their effect in the nephron? 2mks
26. The diagram below shows a tip of a plant coleoptiles with light coming towards it from one side



- (a) How would the plant respond to light? 1mk
- (b) Give the name of such a response. 1mk
- (c) What is the advantage of plants responding in this way? 2mks

27. The experiment illustrated below was set up to investigate a certain physiological process using a raw tuber



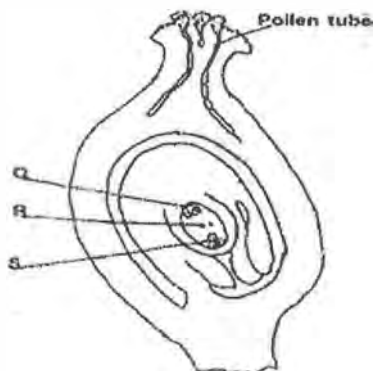
- (a) Suggest a possible physiological process that was being investigated.
 (b) Explain the results obtained in the above experiment after a few hours.
 (c) State the observations that would have been made if the experiment was repeated using boiled potato.

1mk

2mks

1mk

28. The diagram below shows a stage during fertilization in flowering plant.



- (a) Name the parts labeled Q, R and S.
 (b) State the function of the pollen tube.
29. Name two substance transported in the xylem.

3mks

1mks

2mks

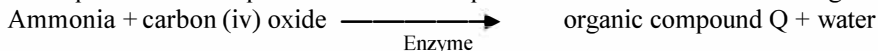
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NYERI CENTRAL
END OF TERM II EXAM 2017
BIOLOGY FORM 4
TIME 2 HOURS
PAPER 2

SECTION A (40MKS)

ANSWER ALL QUESTIONS

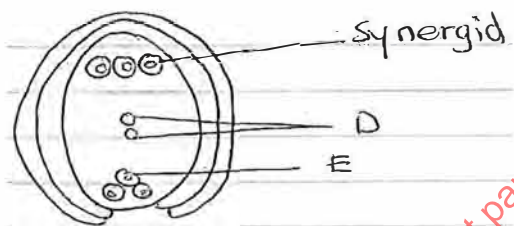
1. The equation below represents a metabolic process that occurs in a certain organ in the mammalian body



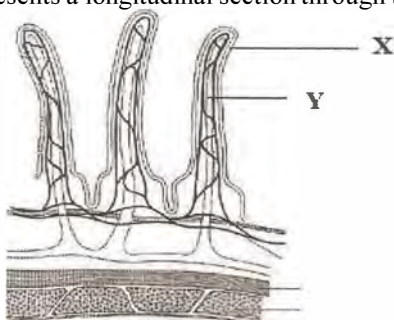
- Name the process represented in the equation above. 1mk
 - Name the organ in which the process occurs. 1mk
 - Why is the process important to mammals? 1mk
 - Identify the organic compound Q. 1mk
 - Explain the source of ammonia in the organ named in (b) above. 2mks
 - What happens to organic compound Q? 2mks
2. An athlete training to take part in an international competition move to a high altitude area where he was to train for twelve (12) days before the competition. He took his pulse rate per minute daily and tabulated them as shown below.

Day	1	2	3	4	5	6	7	8	9	10	11	12
Pulse per minute	72	78	89	92	92	90	86	80	77	74	72	72

- Other than pulse rate, name one other process which was affected by change in altitude. 1mk
 - Account for the change in pulse rate from
 - Day 1 to day 7 1mk
 - Day 8 to day 12 1mk
 - Explain the advantage this athlete has over the one who trains in a lower altitude area. 2mks
 - The equation below represents a reaction which takes place during rapid muscular movements in human.
 - State two effects of this reaction to an individual 2mks
 - How is lactic acid finally eliminated from the muscles tissue after the muscle return to normal movement. 1mks
3. The diagram below shows an embryo sac



- Name the structures labeled D and E. 2mk
 - On the diagram, label the integuments. 1mk
 - On the diagram, mark using letter x the point at which the pollen tube enters the embryo sac. 1mk
 - What is the function of the pollen tube? 2mks
4. In a certain bird species, red flight feathers is controlled by gene R while white flight feather is controlled by gene r. The heterozygous condition Rr results in pink flight feathers.
- By use of a Punnet or fusion lines, find the genotype of a cross between pink flight feathered bird and white flight feathered bird. 4mks
 - Which type of dominances is illustrated here? 1mk
 - Identify the nucleic acid whose base sequence is show below. 1mk
G-A-C-U-A-G-C-G-U
 - Give a reason for your answer above. 1mk
 - If this nucleic acid was involved in protein synthesis, how many amino acids would be present in the protein synthesized. 1mk
5. The diagram below represents a longitudinal section through the ileum wall.



- (a) Identify the structures labeled x and y. 2mks
 (b) State one function of X and Y. 2mks
 (c) State two functions of the ileum. 2mks
 (d) Explain the role of the liver in the digestion. 1mk
 (e) State the endocrine (hormonal) role of pancreas in a mammal. 1mk

section b 40mks

answer question 6 (compulsory) in the spaces provided either question 7 or 8 .

6. The data below was obtained from an experiment designed to measure the velocity of flow of water during the course of a single day in the xylem of two trees of the same species.

Time of day/hr		0300	0600	0900	1200	1500	1800	2100	2400	0300	0600
Velocity of flow/cm hr ⁻¹	Eucalytus specis	0	45	125	140	135	85	45	25	5	0
	Acacia species	-	5	105	135	110	45	30	25	10	0

- (a) Using the same axes, draw graphs to show the velocity of flow against time. 8mks
 (b) At what time of the day was the velocity of flow same for the species? 1mk
 (c) Account for the shape of the graph of Eucalytus. 4mks
 (d) What forces move the water through the plants? 4mks
 (e) Determine the rate of flow at 1900 hrs. 2mks
 (f) Suggest two features of acacia that lead to the difference in the velocity of flow. 2mks
7. (a) How are lungs adapted to their function? 10mks
 (b) Describe the mechanism of opening and closing of stomata using the photosynthesis theory. 10mks
8. (a) Describe the various mechanism of fruit and seed dispersal. 10mks
 (b) Describe the various events that occur in a flower after fertilization. 10mks

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**NYERI CENTRAL
END OF TERM II EXAM 2017
BIOLOGY FORM 4
TIME 2 HOURS
PAPER 3**

FORMS III AND IV

REQUIREMENT FOR FORM II BIOLOGY PRACTICAL

1. NB: Each student will require
- i) A 3cm long arrow root petiole
 - ii) Iodine solution (access to)
 - iii) Benedicts solution (access to)
 - iv) Hydrogen peroxide 20 volumes (access to)
 - v) A petri dish
 - vi) A pestle and mortar
 - vii) Three test tubes
 - viii) A bunsen burner (access to mean of heating)

REQUIREMENTS FOR FORM IV BIOLOGY PRACTICAL

2. NB each student will require
- i) A germinating maize grain/seed labeled specimen A
 - ii) A dry maize seed/grain labelled specimen B
 - iii) Benedicts solution (access to)
 - iv) Iodine solution (access to)
 - v) Pestle and mortar (one between 3 students)
 - vi) A Bunsen burner/mean of heating

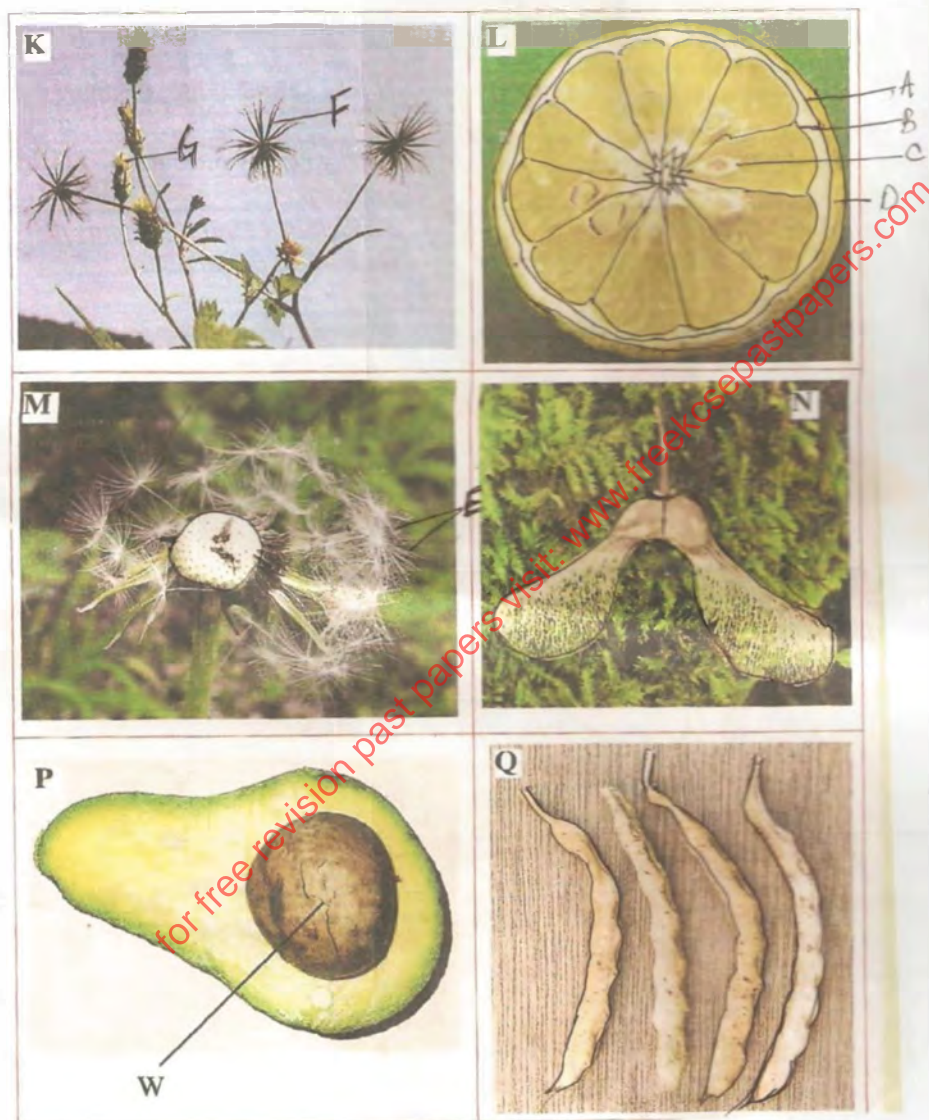
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NYERI CENTRAL
END OF TERM II EXAM 2017
BIOLOGY FORM 4
TIME 2 HOURS
PAPER 3

1. You are provided with specimens A and B, iodine solution, Benedicts solution a bursen burner a pestle and molar. Carry out a food test on the specimens and record your observation in the table below. 12mks

FOOD TESTED	PROCEDURE	OBSERVATION	CONCLUSIONS

2. Study the photograph on the opposite page and then to answer question a, b, c, d, and e

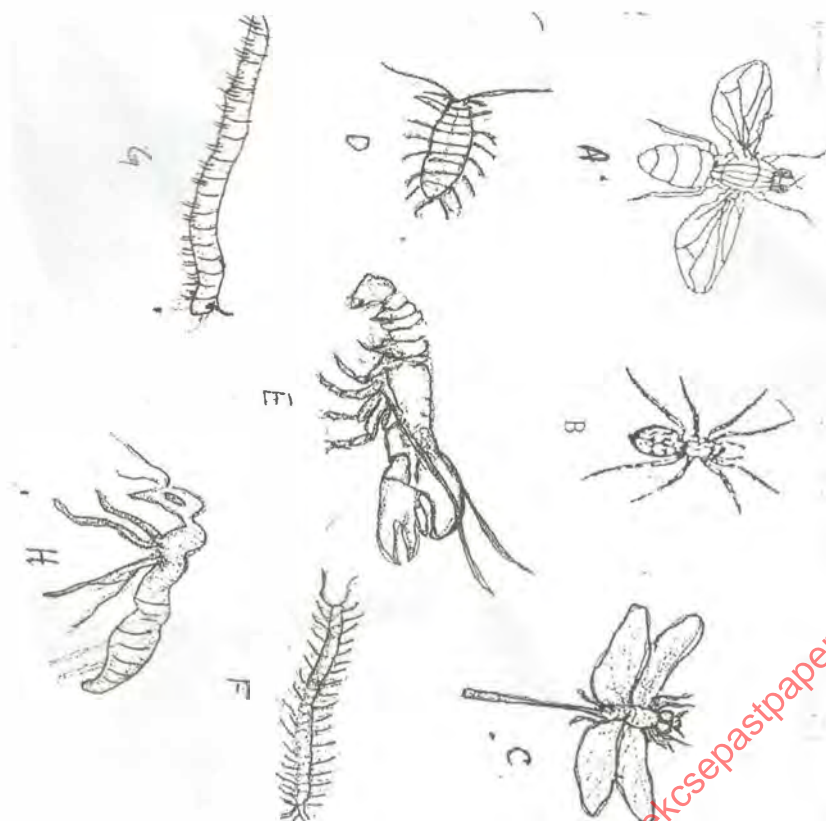


- (a) (i) Label structure A B C D and on specimen L. 4mks
 (b) Name structures E on specimen M. 1mk
 (c) Name structures F and G with reference to reproduction in plants. 2mks
 (d) With a reason state the agent of dispersal for specimens K L M N P and Q

	AGENT	REASON
K		
L		
M		
N		
P		
Q		

(a) What type of placentation is exhibited by specimen Q.

1mk



3. Use the dichotomous key below to identify the animal on the page overleaf

DICHOTOMOUS KEY

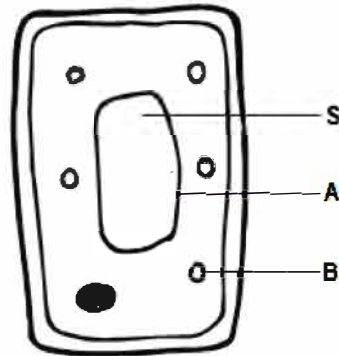
1. (a) Animals with wings----- (go to 2)
(b) Animals without wings----- (go to 3)
2. (a) Animals with one pair of wings----- house fly
(b) Animals with pairs of wings----- dragon fly
3. (a) Animals with three pairs of legs----- Isoptera
(b) Animals with more than three pairs of legs----- go to 4
4. (a) Animals with four pairs of legs----- Arachinidea
(b) Animals with more than four pairs of legs----- (go to 5)
6. (a) Animals with more than two body parts----- water skater
(b) Animals with two body parts----- water shrimp
7. (a) Animals with a cylindrical body----- millipede
(b) Animal with dorsal ventrally flattened body----- centipede

(b). Write down the steps followed to clarify the following organisms and their respective identities.

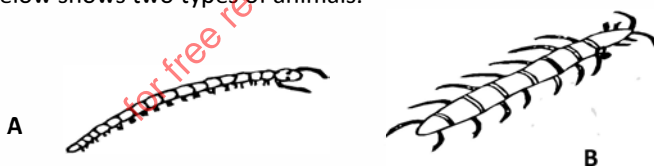
ORGANISM	STEPS FOLLOWED	IDENTIFY OF ORGANISM
A		
B		
C		
F		
G		
H		
G		
H		

KANGEMA MATHIOYA
FORM FOUR END OF SECOND TERM EXAM
BIOLOGY
Paper 1
(Theory)
July/August 2017
Time 2 hours

1. The diagram below shows a specialised plant cell.



- a) Identify the cell. (1 mark)
 b) Name the parts labelled A and B. (2 marks)
 c) State the function of the parts labelled S. (1 mark)
2. a) State two differences between osmosis and active transport. (2 marks)
 b) State an example of active transport in
 i) a plant (1 mark)
 ii) Humans..... (1 mark)
3. State how the endoplasmic reticulum is adopted to its function. (2 marks)
4. a) What is mastication? (1 mark)
 b) What is the significance of the above process? (1 mark)
 c) Name two enzymes present in pancreatic juice and in each case state their role in digestion. (2 marks)
5. a) State the disease due to deficiency of secretion of insulin in humans. (1 mark)
 b) Explain why insulin is not administered orally. (1 mark)
6. a) The type of circulatory system found in the members of the class insecta is (1 mark)
 b) Name the blood vessels which transport blood from (3 marks)
 i) small intestines to the liver
 ii) liver to the venacava.....
 iii) dorsal aorta to the kidneys.....
7. The figures below shows two types of animals.

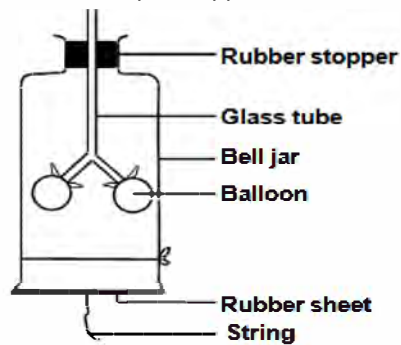


- a) Identify the phylum of the two organism (1 mark)
 b) i) Identify two distinguish characteristics which are used to put the organism into their different classes. (2 marks)
 ii) Name the classes to which the organism belong. A ,B (2 marks)
8. Give the type of variations shown by the following characteristics. (2 marks)
 a) Length of internodes.
 b) Blood groups.
9. Fill in the table below by stating the type of response described and stimulus (4 marks)

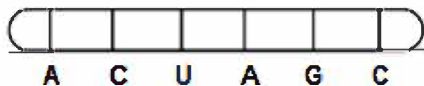
	Description	Type of response	Stimulus
i)	Pollen tube growing towards sugary substances in the style.		
ii)	Folding of leaves on a hot sunny day		

10. Distinguish between convergent evolution and divergent evolution. (2 marks)
11. a) Name a hormone that has inhibitory effects in plants growth. (1 mark)
 b) State two characteristics of meristematic cells. (2 marks)

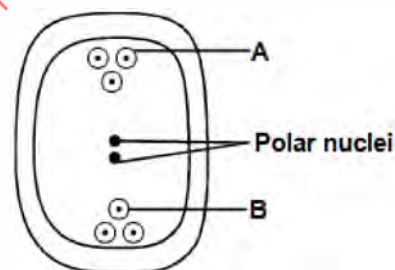
12. Tom and two students set up the apparatus shown below to demonstrate the breathing mechanism in a mammal.



- a) What structure in a mammal is represented by each of the following? (2 marks)
 i) Glass tube
 ii) Rubber sheet
- b) Explain what will happen to the balloons if the rubber sheet is pulled downwards. (2 marks)
13. Identify the only type of vertebrae that has . (1 mark)
 a) Capicular facet (1 mark)
 b) Vertebrarterial (1 mark)
 c) Odontoid process. (1 mark)
14. State the role played by the following bacteria in the nitrogen cycle. (1 mark)
 i) Rhizobium bacteria. (1 mark)
 ii) Nitrosomonas (1 mark)
 iii) Pseudomonas denitrificans. (1 mark)
15. The figure below shows a section of a nucleic acid strand.

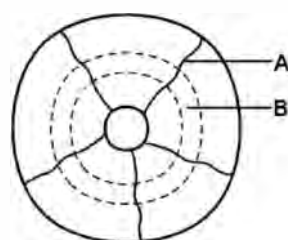


- a) Giving a reason identify the type of nucleic acid shown. (2 marks)
 b) Construct the complementary strand to the one in (a) above. (1 mark)
16. List down three differences between endocrine and nervous system. (3 marks)
17. a) Mutua and Mwende used a light microscope to observe guard cells in a leaf. They indicated a magnification of X450. Given that the eye piece was marked X10, work out the objective lens magnification. (2 marks)
 b) State the function of fine adjustment knob. (1 mark)
18. Name two dental diseases. (2 marks)
19. State one use of each of the following excretory products of plants. (3 marks)
 i) Papain
 ii) Tannin
 iii) Caffeine
20. a) Highlight two similarities between mitosis and meiosis. (2 marks)
 b) Study the diagram below and answer the questions that follow.

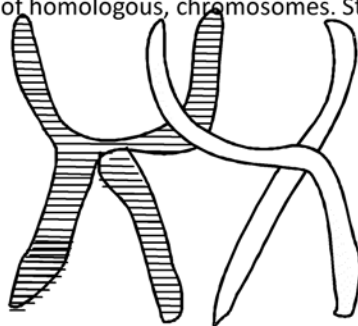


Name the parts labelled A, B and C. (3 marks)

21. The diagram below shows the internal arrangement of muscle fibres in the iris of the human eye.



- i) Identify the muscles labelled A and B
 ii) State what will happen to each muscle when eye is exposed to bright light. (2 marks)
- 22.** State three internal factors that causes seed dormancy. (3 marks)
- 23.** The diagrams below shows a pair of homologous, chromosomes. Study them and answer the questions that follow.



- i) State the phenomenon shown above. (1 mark)
- ii) What is the genetic significance of phenomenon above. (2 marks)
- 24.** Name the structure in the human body that detect.
 i) External temperature changes. (1 mark)
- ii) Internal temperature changes. (1 mark)
- 25.** Describe the path taken by carbon (IV) oxide release from the tissues of an insect to the atmosphere. (3 marks)

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KAGEMA MATHIOYA
FORM FOUR END OF SECOND TERM EXAM

Kenya certificate of secondary education

BIOLOGY

PAPER 2

(THEORY)

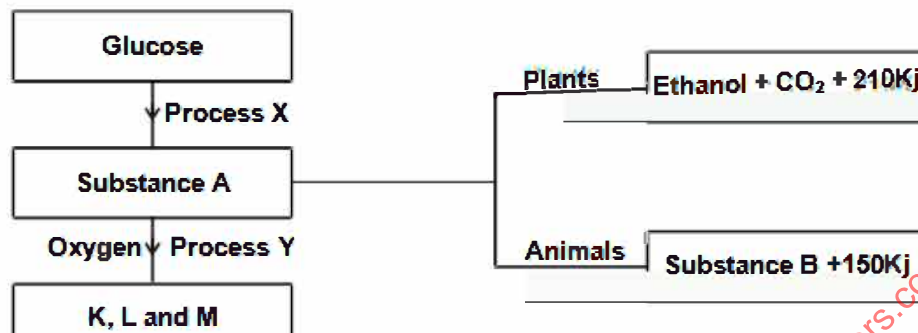
July/August 2017

Time 2 hours

SECTION A: (40 marks)

Answer ALL the questions in this section in the spaces provided.

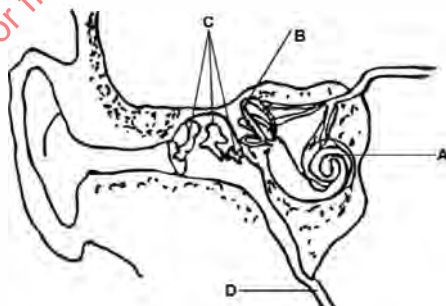
1. The diagram below represents a simple respiratory pathway in cells.



- Name the process marked X and Y. (2 marks)
 - State **two** differences between process X and Y. (2 marks)
 - State the name of substance B and condition under which it is formed. (2 marks)
 - Explain how body size effects the rate of respiration in animals. (2 marks)
2. Cells of a certain herbaceous plant were found to have an average diameter of 2.5mm. The cells were placed in varying concentrations of sugar solution. The average diameter of the cells in each solution was determined and the results obtained were as shown in the table below.

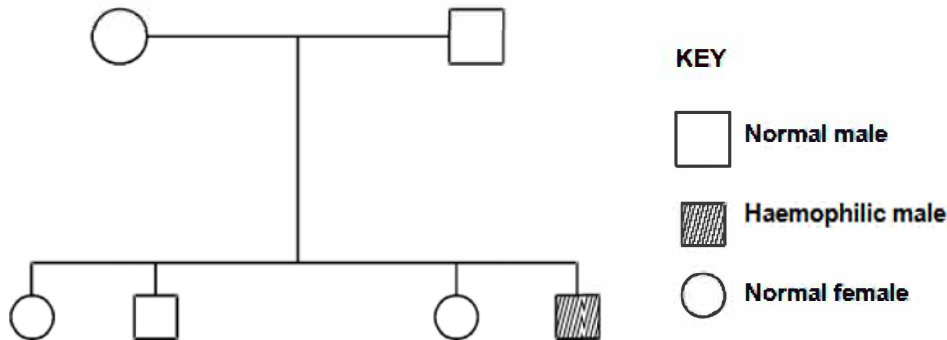
Concentration of sugar solution	Diameter of cells (mm)
1%	5.0
5%	4.0
10%	2.5
15%	2.0

- From these results determine the concentration of the cell sap. (1 mark)
 - What term is given to the sugar solution whose concentration is equal to that of the cell sap? (1 mark)
 - Give an explanation for the average diameter of the cells placed in 1% sugar solution compared to the normal diameter of the cells. (4 marks)
 - Describe the difference in appearance between the cell cytoplasm before and after being placed in 15% sugar solution. (2 marks)
3. Study the diagram below and answer the questions which follow.

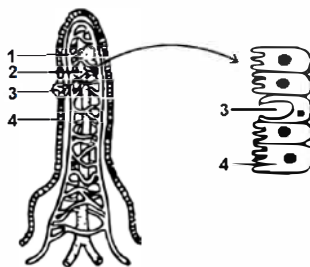


- Name the parts labeled A, B, C, D. (4 marks)
- Describe how part C performs its function. (4 marks)

4. Haemophilia is due to a recessive gene. The gene is sex linked and located on x-chromosome. The figure below shows the offspring from phenotypically normal parents. Using letter h to represent gene haemophilia, answer the questions that follows.



- a) What were the parental genotypes? (1 mark)
- b) i) Work out the genotypes of the offspring. (3 marks)
- ii) State the phenotypic ratio of the offsprings. (2 marks)
- iii) State two other sex-linked characteristics in humans. (2 marks)
5. The diagram represents a villus.



- a) i) State the roles of the following structures in the villus:
Capillary .
Lacteal.
- ii) The epithelial cells, one of which is shown enlarged on the figure have microvilli on their exposed surface. Suggest an advantage of these microvilli to the epithelial cells. (1 mark)
- b) i) Name the process by which the products of digestion, present in high concentration in the ileum, would pass into the capillaries. (1 mark)
- ii) Describe how the capillaries are adapted to allow this process to happen efficiently. (2 marks)
- c) Some substances are absorbed into the capillaries by active uptake.
- i) Explain why active uptake is sometimes necessary. (1 mark)
- ii) Suggest why active uptake stops when the epithelial cells of the ileum are exposed to a respiratory poison. (1 mark)
6. The table below shows the concentration of oestrogen and progesterone hormones in human female reproductive cycle and body temperatures.

Time in Days	Oestrogen mg/100cm ³ of Blood	Progesterone mg/100 cm ³ of blood	Temperature °C
2	20	0	36.6
4	28	0	36.8
6	33	0	36.6
8	40	0	36.7
10	56	0	36.8
12	72	0	36.6
14	170	20	36.3
16	80	80	37.0
18	65	170	37.0
20	65	150	37.2
22	140	110	37.1
24	100	70	37.1
26	60	20	37.0
28	20	0	36.4

- a) Using some axis plot graphs of estrogens and progesterone levels against time (8 marks)
- b) State the possible events taking in the uterus during the first week? (1 mark)
- c) State the events taking place in the ovary between day 2 and day 13. (2 marks)
- d) Account for the sudden increase in the progesterone concentration between day 14 and 18. (2 marks)
- e) What caused the change in temperature between day 14 and 17. (1 mark)
- f) Account for the change of the curve of progesterone between day 19 and 17. (3 marks)
- g) State the function of the following.
- i) Ovary (1 mark)
 - ii) Progesterone. (1 mark)
 - iii) Oestrogen. (1 mark)
7. Explain the process of formation and removal of urea in the human body. (20 marks)
8. a) Describe the adaptation of floating water lily leaf to its photosynthetic function. (10 marks)
- b) Describe the activities that took place in the chloroplast of growing plants. (10 marks)

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KANGEMA MATHIOYA**231/3****BIOLOGY**

Paper 3

(Practical)

July/August 2017

Time 1¾ hours

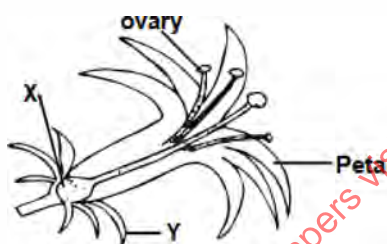
1. You are provided with specimen labelled Q and R. Which are parts of plants. Examine them carefully.
 - a) With reasons in each case, name the parts of the plants.

Specimen Q
Part of the plants (1 mark)
Reason.

Specimen R
Part of the plant (1 mark)
Reason (1 mark)
 - b) Make a transverse section of specimen R. Add a drop of iodine to the cut surface. Observe using a hand lens. Draw a plan diagram of R. Label all the parts sectioned surface of R. (4 marks)
 - c) With a reason, Name the class of plants from which the specimens were obtained.

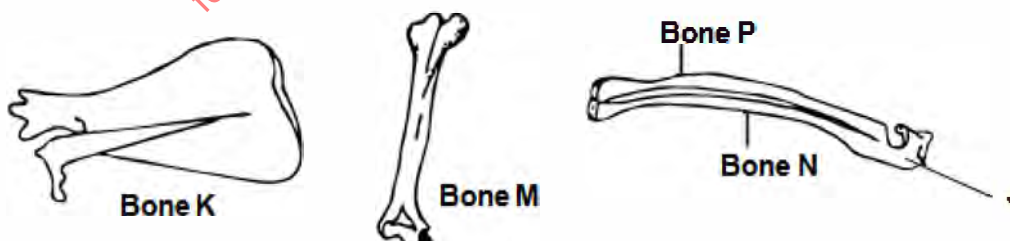
Specimen Q
Class. (1 mark)
Reason (1 mark)

Specimen R
Class (1 mark)
Reason (1 mark)
 - d) What is the importance of specimen R to the life of the plant from which it was obtained? (2 marks)
2. A Biology student observed and drew a flower as shown.



- a) Name the following parts and state their functions. X, Y (4 marks)
- b) Briefly describe the nature of the corolla of the flower drawn. (2 marks)
- c) Briefly describe the nature of the calyx of the flower drawn. (1 mark)
- d) What type of ovary does the flower have? (1 mark)
- e) i) To which class does a plant with this type of flower belong? (1 mark)
ii) Give **one** reason to support your answer in e(i) above.
- f) Give four other characteristics of plants belong to the class identified e(i) above. (4 marks)

3. The photographs below are of bones obtained from the same region of a mammal body.

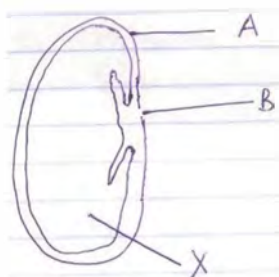


- a) Name the region from which bones were obtained. (1 mark)
- b) Identify the bones. K, N (4 marks)
- c) State three ways by which bone K is adapted to its function. (2 marks)
- d) Giving a reason, name the type of joint that would be found in the animal at the proximal and distal ends of bone M.

Proximal end (1 mark)
Reason. (1 mark)
Distal end (1 mark)
Reason. (1 mark)
- e) What is the significance of the part labelled J in the bone N? (1 mark)

KIGUMO**231/1****BIOLOGY PAPER 1****(Theory)****2 Hours**

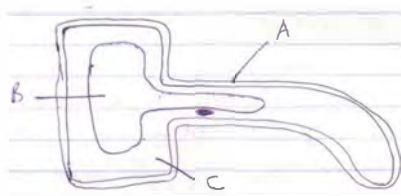
1. Name the constituents of monosaccharides in sucrose (2mks)
2. State three functions of blood plasma. (3mks)
3. Give two differences between photolysis and plasmolysis. (2mks)
4. State three adaptations of wind pollinated flowers. (3mks)
5. Name two distinguishing features of class arachnida. (2mks)
6. State three importances of photosynthesis. (3mks)
7. Name three digestive enzymes contained in pancreatic juice. (3mks)
8. Briefly explain 3 characteristics of gaseous exchange sites. (3mks)
9. List three functional differences between arteries and veins (3mks)
10. The diagram below shows the internal structure of a bean seed.



- a) Name parts A and B. (2mks)
- b) What is the role of structure labeled X? (1mk)
11. Give a term for each of the following.
 - a) Study of fungi _____
 - b) Study of insects _____
 - c) Study of birds. _____
12. A student observed a row of 16 epidermal cells in a microscope field of view that was 8mm in diameter. Calculate the average length of one cell in micrometers.
13. Study the diagram below.



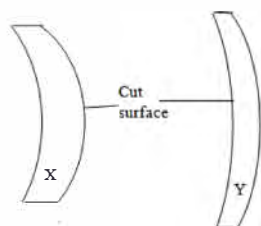
- a) Name the organelle. (1mk)
- b) Name the structure labeled K. (1mk)
- c) Name the chemical compound that is formed in the organelle. (1mk)
- d) Why is the inner membrane highly folded? (1mk)
14. State the main factors that are maintained at a near constant state in human body (3mks)
15. List three differences between aerobic and anaerobic respiration. (3mks)
16. a) Identify the structure drawn below. (1mk)



- b) Name the parts labeled A, B and C. (3mks)
- c) Explain how the structure above is adapted to perform its functions. (3mks)

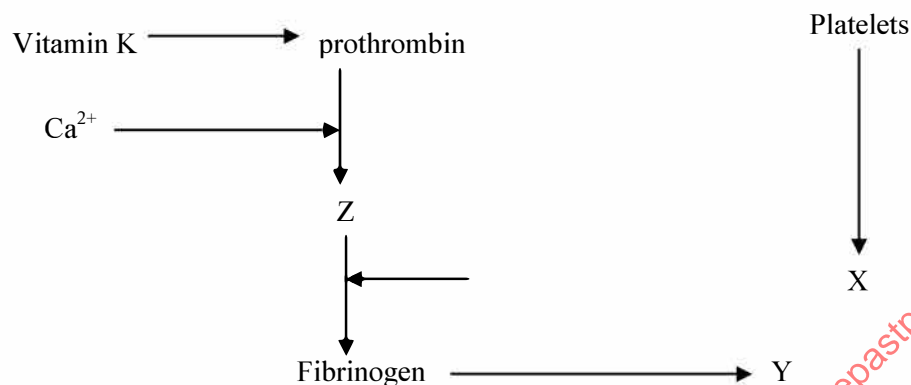
17. Some form ones set up the experiment below.

A fresh piece of young stem was split lengthwise into two equal halves. One was placed in a petridish containing distilled water and the other in concentrated salt solution. After 30 min they appeared as shown below.

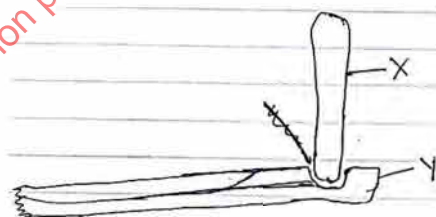


- Identify which piece was placed in concentrated salt solution (1mk)
- Explain what happened in each of the two halves of the stem. (4mks)

18. The flow diagram below represent blood clotting process.

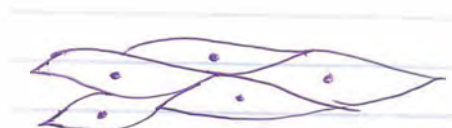


- Name the proteins represented by the letters X, Y and Z. (3mks)
 - State the importance of blood clotting (1mk)
19. i) Name the three ear ossicles (3mks)
 ii) What is their main function? (1mk)
20. A black rabbit was mated with a white male. All the offspring were grey
 a) What term is used in such a case with regard to black and white colour in rabbit? (1mk)
 b) Two grey rabbits were crossed resulting in a litter of 12 young ones. (4mks)
 i) Make a genetic cross to illustrate the above. (1mk)
 ii) State the genotypic ratio of the litter above (1mk)
 iii) Calculate the number of black rabbits in the litter above. (1mk)
21. The diagram below illustrates bones of the forearm in man.



- Name Bone X (1mk)
- Name the functions of the part labeled Y (2mks)

22.



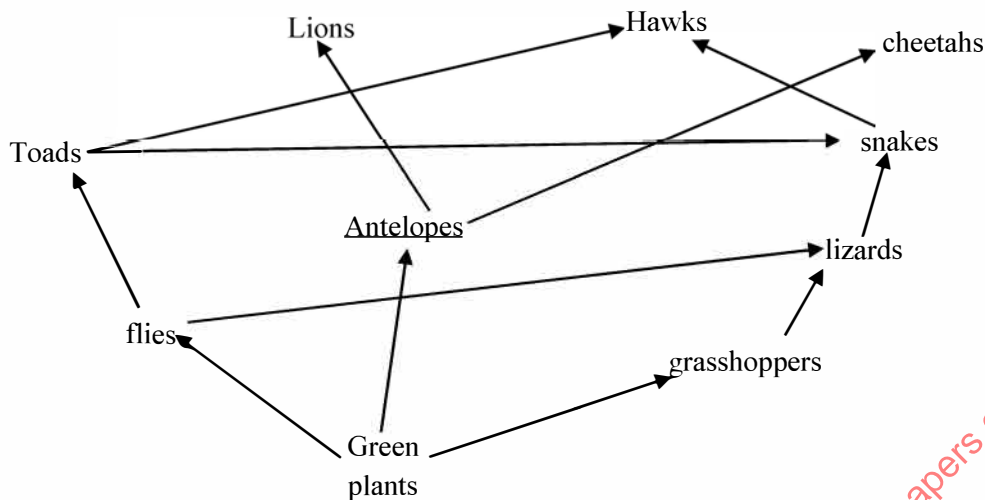
The diagram above shows a type of muscle found in man

- Name the type of muscle. (1mk)
 - List one area where the muscle is found. (1mk)
- Name two vestigial structures in man. (2mks)

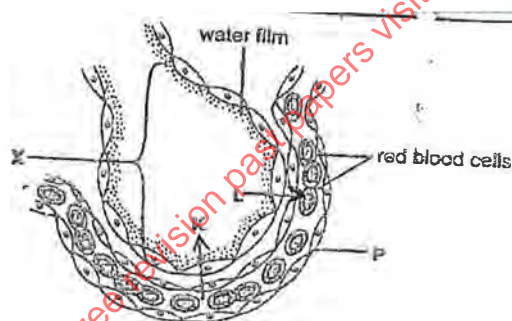
KIGUMO
231/2
BIOLOGY PAPER 2
(Theory)
2 Hours

SECTION A: Answer all questions in this section. (40 mks)

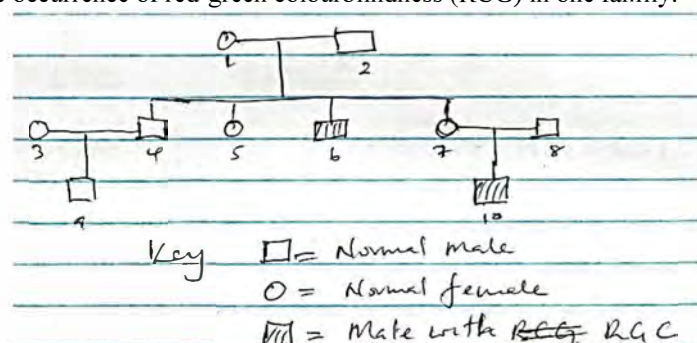
1. The diagram below represents a food web on a terrestrial ecosystem.



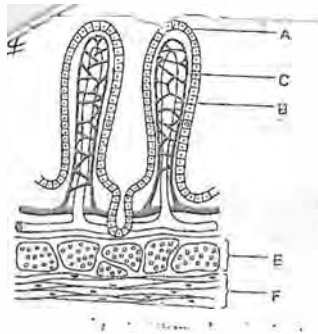
- a) From the food web above, construct a food chain with five organisms. (1mk)
 b) i) Name the trophic level occupied by lizards. (1mk)
 ii) State the name of the competition amongst the lions in the above ecosystem. (1mk)
 c) What would happen if chameleons were introduced into the ecosystem? (3mks)
 d) i) Name the microorganisms that play a crucial role in the ecosystem above. (1mk)
 ii) State the role of microorganisms stated in d(i) above
 2. The diagram below shows the exchange of gases in a human gaseous exchange structure.



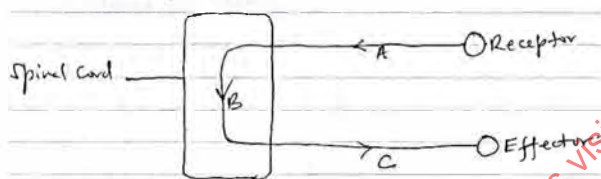
- a) Identify the structure. (1mk)
 b) What substances are represented by letters K,L (1mk)
 c) State the name of the process by which substance K moves. (1mk)
 d) State two adaptations of the structure shown. (2mks)
 e) State two adaptations of the structure of the structure labeled P. (2mks)
 3. Colourblindness is a condition characterized by the inability of the brain to perceive certain colours accurately. It is sex linked. The figure below shows the occurrence of red-green colourblindness (RCG) in one family.



- a) Explain the meaning of the following terms.
- Allele. (1mk)
 - Recessive. (1mk)
- b) Explain why females are less likely than males to have RGC. (2mks)
- c) Show a genetic cross between individual seven(7) and 8. N.B; use letters R for dominant and r for recessive. (4 mks)
4. The diagram below is a cross-section through a part of the epithelium of the human ileum.



- Identify the structures drawn above. (1mk)
 - State the functions of the structures named in a(i) above. (1mk)
 - Name the parts labeled: A,B,C
 - State the function of the part labeled
 - B
 - C
 - Label the 'goblet cell' on the diagram. (1mk)
5. The diagram below represents components of the sensory system in vertebrates. Study it and answer the questions that follow.



- Name the nerve cells;
 - A
 - B
 - C
- Name two types of effectors. (2mks)
- State three ways in which plants compensate for lack of locomotion. (3mks)

SECTION B: (40MKS)

ANSWER QUESTION 6 AND ANY OTHER IN THE SPACES PROVIDED

6. Study the data below which illustrates the rate of water absorption and transpiration in a plant during a period of 24 hours and answer the questions that follow.

Time of the day (HRS)	02	04	06	08	10	12	14	16	18	20	22
Water absorption (ml/hr)	2	1.5	1.5	1.5	2.2	3.5	4.7	5.6	6.0	3.4	2.0
Transpiration (ml/hr)	0.5	0.3	0.5	2.0	3.5	5.0	6.4	7.3	4.5	0.9	0.5

- On the same grid draw a graph of the rate of water absorption and transpiration rate against time of the day. (7mks)
- From your graph deduce the time of sunrise. (1mk)
 - Give a reason for your answer in (i) above. (1mk)
 - At what time was the rate of transpiration maximum? (1mk)
 - At what time was the rate of transpiration equal to the rate of water absorption? (1mk)
- Explain how the transpiration rate is affected by availability of water in the soil. (2mks)
 - Explain any two other possible environmental factors influencing the rate of transpiration between 1000hrs and 1600hrs
- Other than position of the stomata in the leaf state one other stomatal feature that affect the rate of transpiration. (2mks)
- What is meant by the following terms? (3mks)
 - Excretion
 - Secretion
 - Egestion
 - Describe the formation and removal of urea from the human body. (17mks)
- What is meant by natural selection? (3mks)
 - Describe how natural selection brings about adaptation of the species to its environment. (17mks)

KIGUMO SUB-COUNTY CLUSTER EXAMINATION**BIOLOGY 231/3****CONFIDENTIAL**

Each candidate will require

1. Specimen M (Irish potato tuber)
2. Hand lens
3. A scalpel
4. Mortar and pestle
5. Boiling tube
6. Iodine solution
7. 1% Copper (II) sulphate
8. Sodium hydroxide solution
9. DCPIP solution
10. Distilled water
11. 3 test tubes.

KIGUMO**231/3****BIOLOGY PAPER 3****(Practical)****1 ¾ Hours**

1. You are provided with specimen labeled M. observe it and then answer the questions that follow.

- a) What part of a plant is specimen M? Give a reason.

Part

Reason

- b) State two uses of M to the plant.

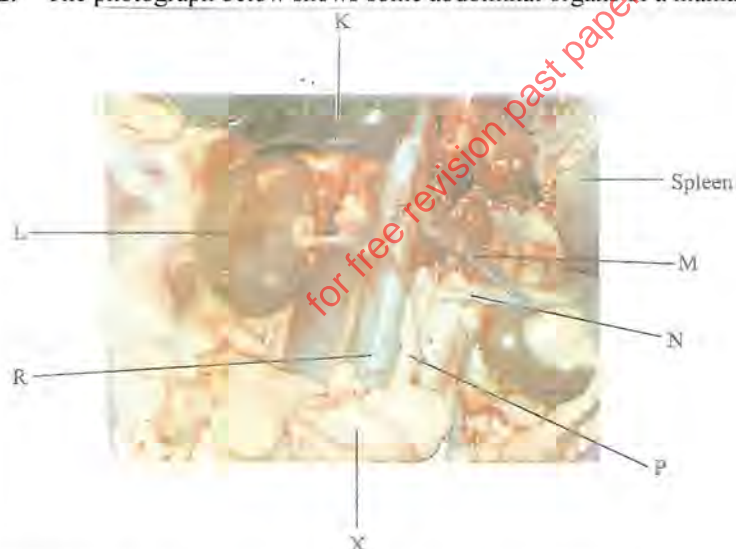
(2mks)

- c) Peel and cut specimen M into small pieces and grind them in mortar with a pestle. Add 10ml of water and decant the extract into a clean boiling tube. Using the reagents provided, carry out food tests on the extract and enter your results in the table below

(9mks)

Test	Procedure	Observation	Conclusion

2. The photograph below shows some abdominal organs of a mammal. Examine it.



- a) Identify the organs labeled K, L and blood vessel M

i) Organ K

(1mk)

ii) Organ L

(1mk)

iii) Blood vessel M

(1mk)

- b) (i) Which major metabolic waste is mainly removed by the organ labeled L?

(1mk)

(ii) Which of the blood vessels M and N contains more of the metabolic waste named in b (i) above. Explain

(3mks)

- c) (i) In which of the labeled structures is the main metabolic waste removed by organ formed?

(1mk)

(ii) Explain how the metabolic waste you named in b(i) above is formed in the structure you named in c(i) above

- d) Name the blood vessel labeled R and state its function

(i) Name (1mk)

(ii) Function (1mk)

e) Name the tissue labeled X and state its major role.

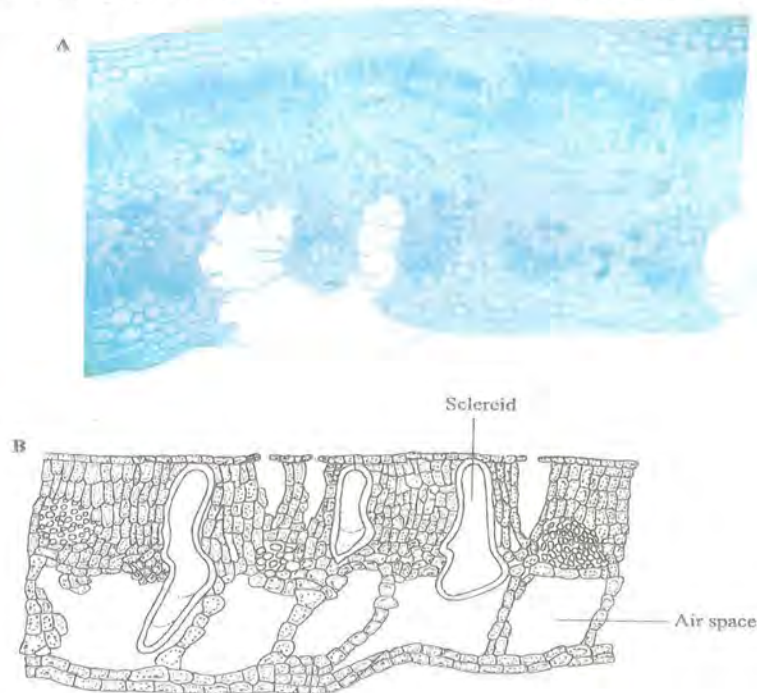
i) Name

(1mk)

ii) Role

(1mk)

3. Photograph A and diagram B below shows cross-sections of two plant leaves. Examine them.



a) Suggest the natural habitats of each of the plants.

i) Plant A

(1mk)

ii) Plant B

(1mk)

b) For each of the specimens, give three observable features that adapt it to its natural environment

A

(3mks)

B

(3mks)

c) What is sclereid and what is its importance in specimen B?

i) Description

(1mk)

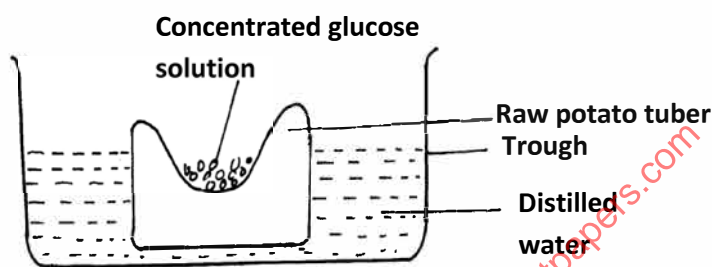
ii) I

d) What is the importance of air spaces in specimen B?

(2mks)

TRIAL 231/1
BIOLOGY
(THEORY)
PAPER 1 TIME:
2 HOURS
JULY/AUGUST

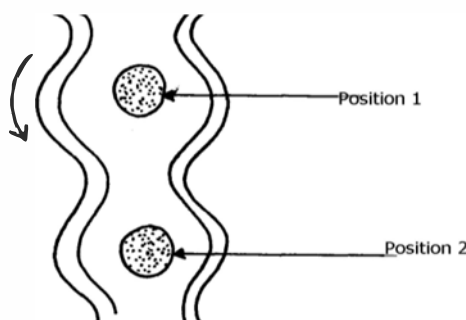
1. **Explain** the following terms.
 - a) Taxonomy (1 mark)
 - b) Species (1 mark)
2. State **three** features used in classifying arthropods into classes. (3 marks)
3. State **two** main functions of a microscope. (2 marks)
4. State **two** functions played by the cell wall in plant cells and give the adaptation of the cell wall to performing each of the stated functions. (4 marks)
5. The experiment illustrated below was set up to investigate a certain physiological process using a raw tuber



- (a) Suggest a possible physiological process that was being investigated. (1 mark)
- (b) Explain the results obtained in the above experiment after a few hours. (2 marks)
- (c) State the observations that would have been made if the experiment was repeated using boiled potato. (2 marks)
6. (a) State **two** importance of active transport in living organisms. (2 marks)
- (b) Why is oxygen concentration important in active transport? (1 mark)
7. What is the significance of each of the following in photosynthesis?
 - (i) Chlorophyll in the leaf (1 mark)
 - (ii) Stomata on the leaf surfaces (1 mark)
 - (iii) Leaf midrib and veins (1 mark)
8. **Name** the form in which carbohydrates are stored in. (2 marks)
 - i). Plants tissues
 - ii). Animal tissues
9. A solution of sugar cane was boiled with dilute hydrochloric acid. Sodium hydrogen carbonate was added and then heated with Benedict's solution. An orange precipitate was formed.
 - (a) Why was the solution boiled with dilute hydrochloric acid. (2 marks)
 - (b) To which class of carbohydrates does sugar cane belong? (1 mark)
10. An animal has the following dental formula

I	3	c	1	pm	4	m	2
	3		1		4		3

- a) Calculate the number of teeth. (1 mark)
 - b) Explain what would result from blockage of bile duct. (2 marks)
11. The diagram below shows how food bolus move along the human oesophagus and the Intestine



- (a) Identify the process illustrated in the diagram (1 mark)
 (b) Name **one** component of a person's diet that assists in the movement of food described in from position 1 and position 2 (1 mark)
12. The table below show the percentage composition of carbon (IV) oxide and oxygen inhaled and exhaled air

Gases	Inhaled air	Exhaled air
Oxygen	20%	17%
Carbon (IV) oxide	0.04%	4.0%

Explain the differences in the percentage of the two gases in inhaled and exhaled air.

(2 marks)

13. The table below shows the energy use per day in kilojoules

Age(years)	Male	Female
2	5,500	5,500
5	7,000	7,000
8	8,800	8,000
11	10,000	9,200
14	12,500	10,500
18	14,200	9,600
25	12,100	8,800

- a). From the table, explain why after age 8 males require more energy than females. (1 mark)
 b). Other than sex and age, name **two** other factors that determine energy requirements in human beings (2 marks)
14. a) **Name** the substance that accumulates in muscles when respiration occurs with insufficient oxygen. (1 mark)
 b) Give the **three** end products of anaerobic respiration in plants. (3 marks)
15. a). Distinguish between **single** and **double** circulatory system (1 mark)
 (b) Name **two** defects of the circulatory system in humans. (2 marks)
 (c) State **two** functions of blood other than transport. (2 marks)
16. State two adaptations of xylem to water transportation (2 marks)
17. **Explain** how water is gained from the soil by root hairs in plants. (2 marks)
19. (a) What is homeostasis? (1 mark)
 (b) State three processes in humans in which homeostasis is involved. (3 marks)
20. (a) Name the fluid that is produced by sebaceous glands. (1 mark)
 (b) What is the role of sweat on the human skin? (2 marks)
21. a) In what form does energy enter the earth's ecosystem? (1 mark)
 b) What is the **main** source of energy in an ecosystem (1 mark)
 c) In what form does energy transferred from one trophic level to another? (1 mark)
 d) If only a small fraction of energy is transferred from one trophic level to another, what happens to the rest of the energy? (1 mark)
22. a) What are halophytes? (1 mark)
 b) **State two** adaptations of halophytes to their habitats. (2 marks)
23. (a) What is meant by self sterility in reference to plants? (1 mark)
 (b) State **two** characteristics of a wind pollinated flower. (2 marks)
24. What causes apical dominance? (1 mark)
25. a) Define organic evolution. (1 mark)
 b). Give the role played by variation in the process of evolution. (2 marks)
26. (a) Explain what is meant by a test-cross as used in genetics. (1 mark)
 (b) Determine the probability of a couple with blood group AB getting a child with blood group **B**. (Show your working). (2 marks)
27. State **two** functions of ovaries in humans. (2 marks)
28. a) State **two** disadvantages of sexual reproduction. (2 marks)
 b) State **two** adaptations of the human spermatozoa. (2 marks)

TRIAL

231/2

BIOLOGY

PAPER 2

(THEORY)

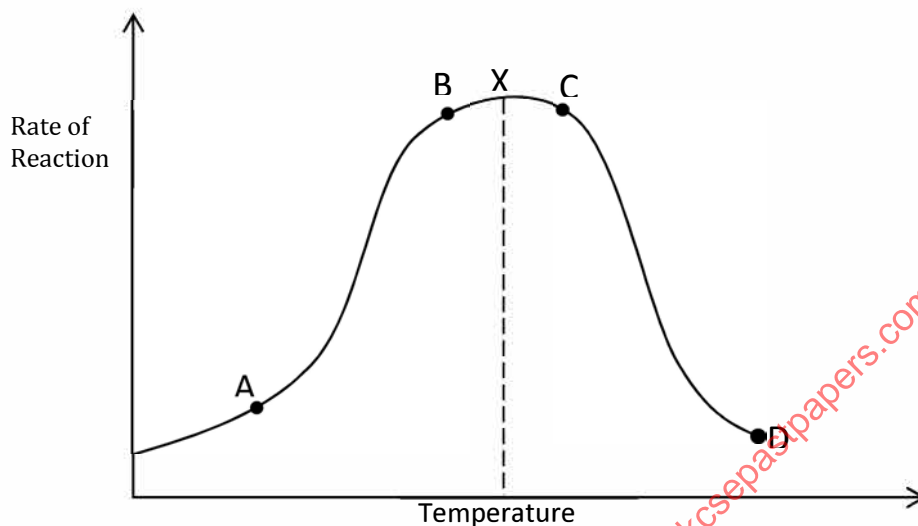
TIME: 2 HOURS

JULY/AUGUST

SECTION A (40) MARKS

Answer all questions

1. The graph below show the effect of temperature on an enzyme catalyzed reaction.



- (a) Account for the shape of the curve between.
 (i) A and B.
 (ii) C and D.
 (b) What does the point marked X represent?
 (c) Apart from temperature, state **two** other factors that affect the rate of enzyme controlled reaction.

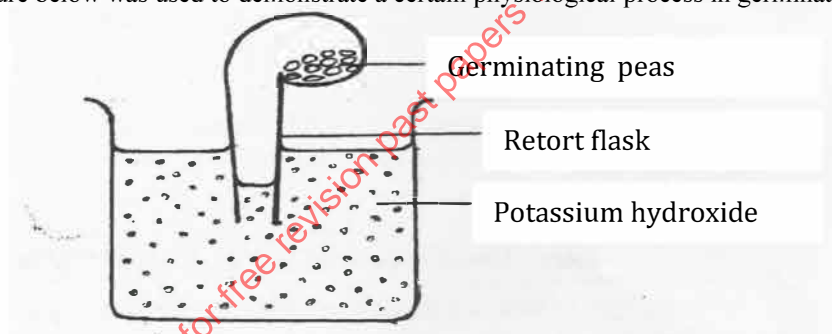
(3 marks)

(2 marks)

(1 mark)

(2 marks)

2. The figure below was used to demonstrate a certain physiological process in germinating Seeds.



- (a) What observations would be made in the set-up at the end of the experiment?
 (b) i. Suggest what would happen in the set-up if the seeds were mixed with pyrogalllic acid
 ii. Explain your answer in b (i) above.
 (c) What chemical change is taking place in the germinating peas?
 (d) Suggest a control experiment for this set-up.
3. In an experiment to compare the basal metabolic rate of some animals, the amount of oxygen consumed per unit body weight in a given period of time was determined. The table below shows the results of the investigations.

(2 marks)

(1 mark)

(2 marks)

(2 marks)

(1 mark)

Animal	Body weight(Kg)	Oxygen consumed (g/hr.)
Buffalo	546	47
Man	58	203
Rabbit	3	318
Rat	0.1	700
Mouse	0.02	1510

- (a) Comment on oxygen consumed by the buffalo and the mouse.

(1 mark)

the volume of

(b) Account for the above comparison for:

(i) Buffalo (2 marks)

(ii) Mouse (2 marks)

(c) What is Basal metabolic Rate (BMR)? (1 mark)

(d) Explain how high temperature increases the rate of diffusion. (2 marks)

4 (a) what is multiple allelism? (1 mark)

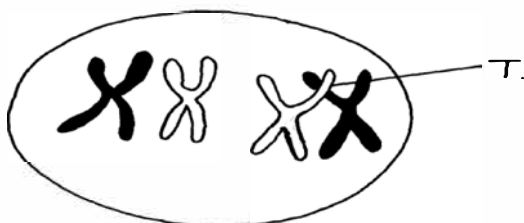
(b) A pure breeding black male mouse was mated with a pure breeding brown Female mouse.
All the offspring had black coat colour.

(i) Explain the appearance of black coat colour in the offspring. (1 mark)

(ii) If the black parental mouse was mated with a mouse that is heterozygous for coat colour, work out the genotypic ratio of offspring. Show you're working (5 marks)

(iii) State **two** disorders in human beings that are as a result of chromosomal mutations. (2 marks)

5. The diagram below shows a phenomenon which occurs during cell division.



(a) Identify the phenomenon exhibited in the diagram above. (1 mark)

Identify the type of cell division in which this phenomenon occurs. (1 mark)

(c) Name the part labeled T and states its biological importance (2 marks)

(d) Name **two** organs in a human being where this type of cell division occurs (2 marks)

(e) On the table below, state the significant events that occur during cell division (2 marks)

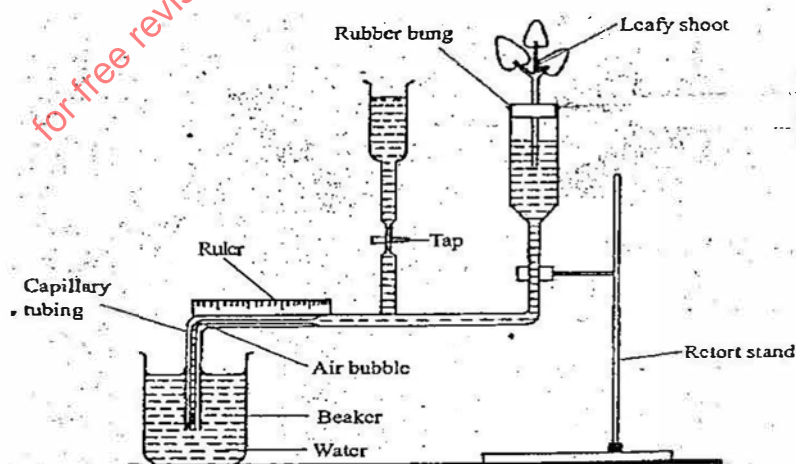
Stage in cell division	Meiosis 1	Mitosis
Metaphase		
Anaphase		

SECTION B (40MARKS)

Answer question 6 (COMPULSORY) in the spaces provided.

Answer either question 7 or 8.

6. An investigation was conducted to compare water loss from twigs of two species of plants Q and L. The apparatus shown below was used for this investigation. The twigs had equal leaf surface.



The results of the investigation were recorded in the table below.

Time of the day	6am	8am	10am	12noon	1pm	2pm	3pm	4pm	6pm	8pm	12 midnight
Water loss gh^{-1} species Q	0	4	20	40	55	36	26	20	2	0	0
Water loss gh^{-1} species L	8	20	39	131	198	182	130	81	45	12	12

- (a) Plot a graph of water loss gh^{-1} against time for the two plants. (7marks)
- (b) Name the apparatus used in the above investigation (1 mark)
- (c) State **TWO** precautions that were taken in setting up this experiment. (2 marks)
- (d) Which of the plant species is likely to be adapted to arid conditions? Give reason. (2 marks)
- (e) **Use the graph to answer the questions that follow:**
- (i) At what time of the day was 60gh^{-1} of water lost by plant species? (1 mark)
- (ii) What was the rate of water loss from plant species **Q** at 11.00am? (1 mark)
- (f) Account for the rate of water loss between 6.00am to 1.00pm by plant species **L**. (4 marks)
- (g) Suggest how the stomata of species **Q** are structurally adapted to water loss. (2 marks)
7. a) **Define the term secondary thickening.** (2 marks)
- b) Briefly describe how secondary thickening occurs in woody plants. (14 marks)
- c) i) State **two** ways in which growth in plants is different from that in Animals. (2 marks)
- ii) State how ecdysia affects the growth of insects. (2 marks)
8. (a) Describe how natural selection brings about the adaptation of a species to its environment. (10 marks)
- (b) Discuss the economic importance of bacteria. (10 marks)

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TRIAL
231/3
BIOLOGY
PRACTICAL
PAPER 3
TIME: 2 HOURS
JULY/AUGUST

MOCK EXAMINATION - 2017

CONFIDENTIAL INSTRUCTION TO SCHOOLS

The information contained in this paper is to enable the head of the school and the teacher in charge of Biology to make adequate preparations for this year's Biology Practical examination.

NO ONE ELSE should have access to this paper or acquire knowledge of its contents. Great care **MUST** be taken to ensure that the information herein does not reach the candidates either directly or indirectly. The teacher in charge of Biology **SHOULD NOT** perform any of the experiments or give any information related to these instructions to the candidates.

Each student to be provided with the following:-

1. Specimen W - clean fresh large Irish potato
2. Cork borer - 0.5 cm diameter
3. Distilled water
4. 2 beakers - 100 ml each
5. Concentrated sucrose solution labelled X 100 ml
6. Distilled water labelled Y 100ml
7. Tissue paper
8. 30 cm ruler
9. Iodine solution
10. Benedict's solution
11. 1% Copper sulphate solution
12. 10% Sodium hydroxide solution
13. Dilute hydrochloric acid
14. Sodium hydrogen carbonate
15. 5 test tubes
16. Means of heating
17. 2 labels.
18. Measuring cylinder.
19. Scalpel
20. Stop watch

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231/3
BIOLOGY
PRACTICAL
PAPER 3
TIME: 2 HOURS
JULY/AUGUS

1. Photographs Q1, R1 and S1 belong to different organisms. Study them

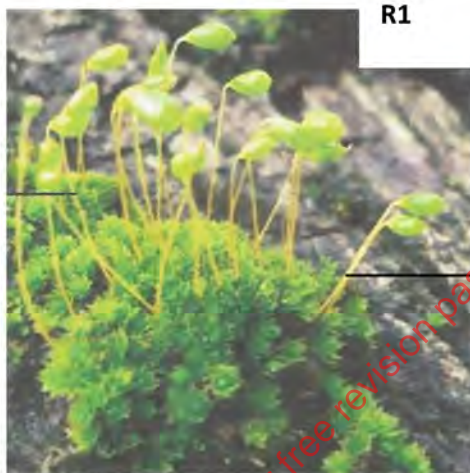
Q



T



R1



S



S1

- (a) Identify the kingdom to which the organisms belong.

(2 marks)

Organism	Kingdom
Q1 and R1	
S1	

- (b) Name the divisions to which **Q1** and **R1** belong

(2 marks)

Organism	Division
Q1	
R1	

- (c) Name the structures labeled **S**, **T** and **U**

(3 marks)

- (d) (i) Name the structures responsible for reproduction of **S1**.

(1 mark)

- (ii) Explain the importance of organism **S1** in nature

(1 mark)

- (e) State the mode of nutrition for organism **S1** and **Q1**

(2 marks)

- (f) Name the dominant generation of specimen **Q1** in wet weather

(1 mark)

2. a) You are provided with specimen **W** push a cork borer through specimen **W** to remove 4 cylinders of potato tissue. Cut off one end of each cylinder. From the cut end measure 40 mm lengths and cut the cylinder. Repeat this for the other three

cylinders. Put 25ml of solution X in a beaker labelled X and 25ml of solution Y in a beaker labelled Y. Place two cylinders in a beaker containing solution Y and the other two in a beaker containing solution X. Leave the experiments for 45 minutes. After 45 minutes remove the cylinders and mop them up with a tissue paper. Measure and record the length of each cylinder in the table below. (8 marks)

Cylinder in solution		Initial length	Final Length	Average length	% change in length
X	1				
	2				
Y	1				
	2				

b) Account for observations made in solution

(i) X

(2 marks)

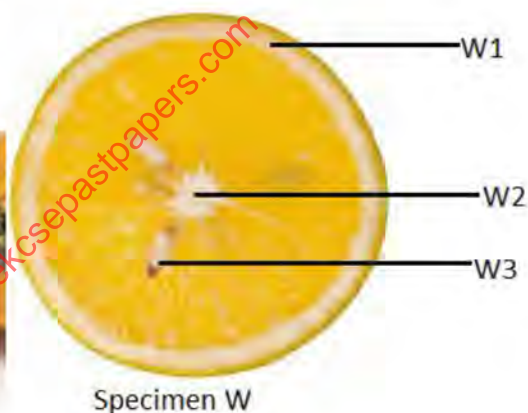
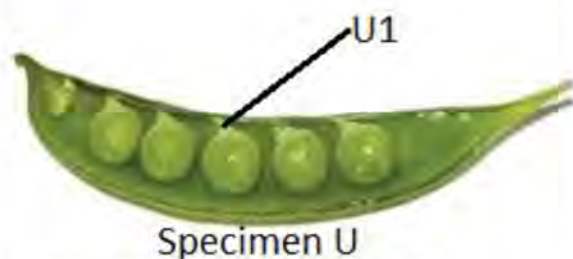
(ii) Y

(2 marks)

c). Peel the remaining potato and crush it completely using a mortar and pestle. Add 25ml of solution S and stir well. Crush the potato further. Put the solution in a beaker leaving out the residue in mortar. Label the solution as B. Divide solution B in four portions in test tubes and carry out food tests using the reagents provided. Complete the table below. (10 marks)

Food Substance	Procedure	Observation	Conclusion
----------------	-----------	-------------	------------

3. Study the specimens provided below.



- Name the parts labeled U1, W1, W2 and W3. (4 marks)
- Suggest the mode of dispersal of the specimen labeled U. (1 mark)
 - Give a reason for your answer in (b) (i) above. (1 mark)
- Suggest the mode of dispersal of the specimen labeled X. (1 mark)
 - Give a reason for your answer in (c) (i) above. (1 mark)
- On the specimen V, label the mesocarp and placenta. (2 marks)
- State two advantages of dispersal in plants. (2 marks)
- State the type of placentation of specimen U, V and W. (3 marks)
- What is parthenocarpy? (1 mark)

GITUAMBA / LAIKIPIA

231/1

Biology

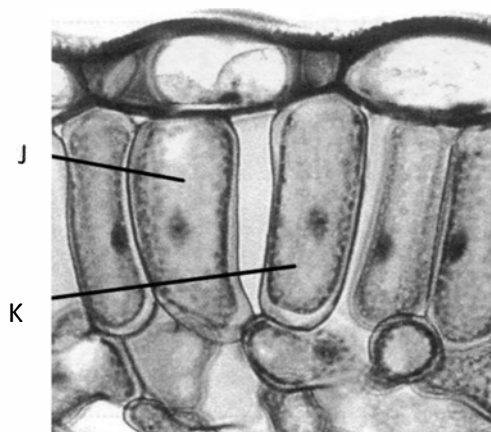
Paper 1(Theory)

June / July 2017

2 hours

Answer All Questions on the spaces Provided

1. List any two uses of energy obtained from the process of respiration. (2marks)
2. The photomicrograph below shows some cells viewed using a light microscope.

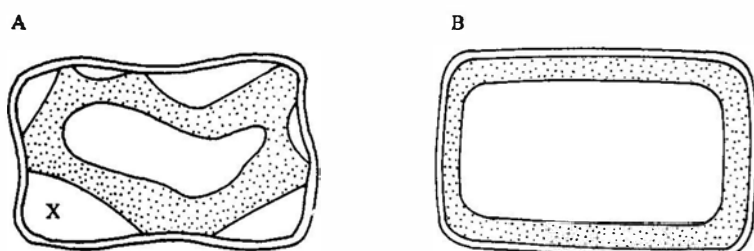


- (a) Name the tissue in which the cells labelled J and K are found, giving **one** reason for your identification. (2 marks)
 - (b) Give the function of this tissue. (1 mark)
3. Use the figure below to answer questions that follow:



- a) Name the spore producing structures that constitute the part labeled S. (1mark)
 - b) Identify **two** features that distinguish the specimen above from higher plants. (2 marks)
4. (a) **Give two** external features that can be used to classify animals in to class Pisces. (2 marks)
 - (b) State **two** characteristics of Monera that are not found in other kingdoms (2 marks)
5. In fish there is a counter-current flow system.
 - a). What does “counter-current” flow mean. (1 mark)
 - b). How does counter-current flow assist in gaseous exchange (2 marks)
 6. State **two** adaptations of plants which enable them to reduce water loss. (2 marks)
 7. The equation below shows respiration for a certain food substance. Study it and answer the questions that follow:

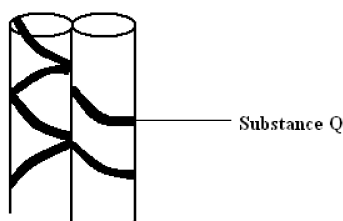
$$2 \text{C}_5\text{H}_8 \text{O}_6 + 145 \text{O}_2 \rightarrow 102 \text{CO}_2 + 98\text{H}_2\text{O}.$$
 - i) Calculate the respiratory quotient (RQ). (2marks)
 - ii) Suggest the possible food substance. (1mark)
 8. The diagrams below represent two plant cells A and B placed in two different solutions. Study the diagrams and answer questions that follow:



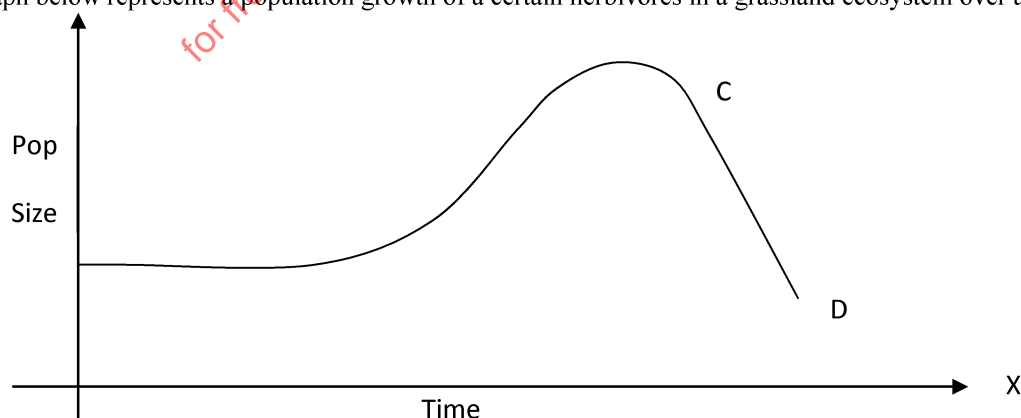
- a) Identify the nature of solution into which each cell was placed. A ,B (2marks)
 b) Name the physiological process responsible for the observed results. (1mark)
 9. State the three different types of blood cells. (3 marks)
 10. a) Explain why swallowing and breathing in cannot occur at the same time. (2marks)
 b) Why is it necessary that pepsin is produced in its inactive form?. (1mark)
 11. Explain how ingestion of very salty food may affect the quantity of urine produced (2 marks)
 12. Suggest reasons to account for the following observation: In the savanna there is a wider variety of herbivores in the wooded areas than in the open grassland. (2 marks)
 13. The dental formula below was written by a student after observing a skull of an animal;

$$\begin{array}{ccccccc} i & 0 & c & 0 & Pm & 3 & 3 \\ & 2 & & 1 & & 3 & 3 \end{array}$$

- i) How many teeth does the animal have? (1mark)
 ii) State the mode of feeding of the animal. (1mark)
 iii) Give a reason for your answer in (ii) above. (1 mark)
 14. The diagram below represents a structure of xylem vessel. Study it to answer the questions that follow.



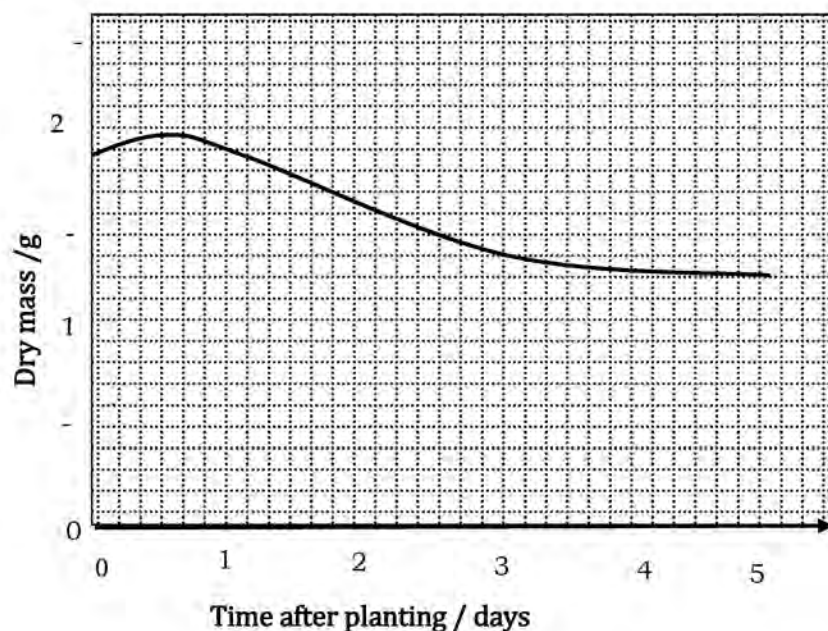
- a). Name substance Q . (1 mark)
 b). Explain the function of the named substance in (a) above? (2 marks)
 15. (a) State the importance of pleural fluid in the lung of a mammal. (1 mark)
 (b) What function does the cilia of the trachea play during gaseous exchange in a mammal? (1 mark)
 (c) What significance does mucus offer a mammal during gaseous exchange? (1 mark)
 16. (a) Why are green plants referred to as primary producers in ecosystem? (1 mark)
 (b) Give a reason why two species cannot occupy the same niche. (1mark)
 17. Why would burning charcoal in a poorly ventilated room cause death? (2marks)
 18. State the role of the following in a nitrogen cycle:
 a) Nitrogen fixing bacteria. (1mark)
 b) Nitrifying bacteria. (1mark)
 19. a) State **two** limitations of using fossil records as evidence of evolution. (2 mks)
 b) What is the significance of isolating mechanisms in the process of evolution? (3marks)
 20. a) What is dioecism? (1mark)
 b) What is the role of dioecism in evolution? (1mark)
 21. The graph below represents a population growth of a certain herbivores in a grassland ecosystem over a period of time.



Suggest two factors that could have caused the population change between C and D

22. State the functions of each of the following parts of the human ear (2 marks)
 (a) Eustachian Tube
 (b) Auditory nerve

23. The graph below shows the changes in the dry mass of a broad bean seed in the first five days after planting



State and explain explanation for the changes that happen to the dry mass of the seed in the first five days after planting. (3 marks)

24. The diagram below shows the structure of a flower



- a). Name the plant family to which the flower belongs. Give a reason for your answer. (2 marks)
 b). Name the agent of pollination (1 mark)
25. a) What are vestigial structures? (1 mark)
 b) Name **two** examples of vestigial structures in human being. (2 marks)
26. Part one of DNA molecule was found to have the following sequence.
G – C – C – C – T – A – G – A
 What is the sequence:-
 (a) Of the complimentary strand (1 mark)
 (b) On a m- RNA strand copied (1 mark)
27. State **two** applications of genetic in our day to day life. (2 marks)
28. State **two** importance of fruit and seed dispersal. (2 marks)
29. Name the chemical substances involved in thickening of the following support tissues in plants (2 marks)

GITUAMBA LAIKIPIA

231/2

Biology

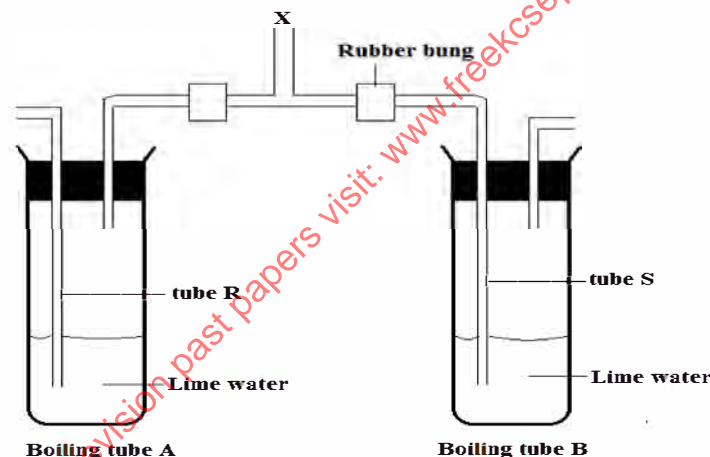
Paper 2 (Theory)

Term two 2017

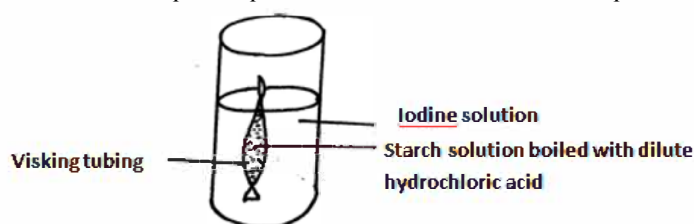
2 hours

SECTION A. 40 MARKS**Answer all the Questions in this section**

1. a) What is meant by the following ecological terms.
 - i) Population. (1mark)
 - ii) Community. (1 mark)
 - iii) Ecosystem (1mark)
- b) What is the importance of the following in an ecosystem?
 - i) Decomposers (1 mark)
 - ii) Predation. (1mark)
- c) Give a reason why two species in an ecosystem cannot occupy the same niche. (2marks)
- d) Name the bacteria found in the root nodules of leguminous plant. (1mark)
2. In human haemophilia is caused by a recessive gene. A man whose mother was haemophiliac marries a normal woman whose father was haemophiliac. Set H represents dominant gene.
 - (a) Define the term recessive gene. (1mk)
 - (b) (i) What is the possible genotype of the woman. (1mk)
 - (ii) Using pannet square work the genotypes of the first filial generation. Show your work. (4mks)
 - (c) (i) What is the probability of the daughter being haemophilic. (1mk)
 - (ii) State **one** advantage of mutation to plants. (1mk)
3. The apparatus whose diagram is given below can be used to demonstrate results of a physiological process that occurs in a mammal. To use the apparatus, the experimenter places his mouth at the point marked X and breathes in and out gently

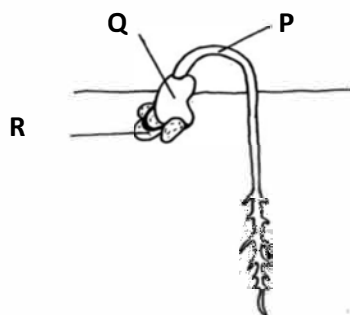


- a) State the observations in the boiling tube when the experimenter
 - i) Breathes in
 - Boiling tube A (2 marks)
 - Boiling tube B (1mark)
 - Breathes out?
 - Boiling tube A (1mark)
 - Boiling tube B (1 mark)
- a. What conclusion can you draw from the results of this experiment (2 marks)
- b. What is the purpose of the boiling tube A? (1mark)
4. A group of students set up an experiment to demonstrate a certain process as shown below.



After 10 minutes the students carried out iodine test inside and outside the visking tubing.

- (a) State **two** roles of the process being investigated in animals. (2mks)
- (b) Account for the result expected in the experiment above. (3mks)
- (c) (i) What is the importance of plasma membrane in active transport. (2mks)
- (ii) Give **one** similarity between osmosis and active transport. (1mk)
5. The diagram below represents a stage of growth in a seed during germination.



- (a) (i) Name the type of germination illustrated above (1mk)
- (ii) Give a reason for your answer in (i) above (1mk)
- (b) Name the part labelled R in the above diagram. (1mk)
- (c) Give **two** functions of the part labeled Q (2mks)
- (d) Explain how the part labeled P straightens. (3mks)

SECTION B (40 MKS)

Answer question 6 (Compulsory) and either question 7 or 8 in the spaces provide after question 8

6. Form four carried out an experiment to investigate the rate of growth of pollen tube against time. The results were tabulated in a table below as shown below

Time in minutes	Length of pollen tube in millimeters
0	0
20	4
40	9
60	15
80	20
100	21
120	22

- (a) Plot a graph of pollen tube length against time on the graph paper provide (6mks)
- (b) (i) Determine the growth rate between 80 minute and 34 minute (2mks)
- (ii) What was the length of the pollen tube at 90 minutes (1mk)
- (iii) At what time was the length of the pollen tube was 18mm (1mk)
- (c) With reasons, describe the growth pattern of the pollen tube between
 - (i) 0-80 minutes (2mks)
 - (ii) 80-120 Minutes (2mks)
- (d) Give the importance of the growth of pollen tube to the plant (2mks)
- (e) Mention the changes that take place in a flower after fertilization (2mks)
7. (a) Discuss the economic importance of fungi (10mks)
- (b) Describe the photosynthesis theory of the opening of stomata in plants (10mks)
8. Explain how mammalian body maintains constant water balance during osmoregulation (20mks)

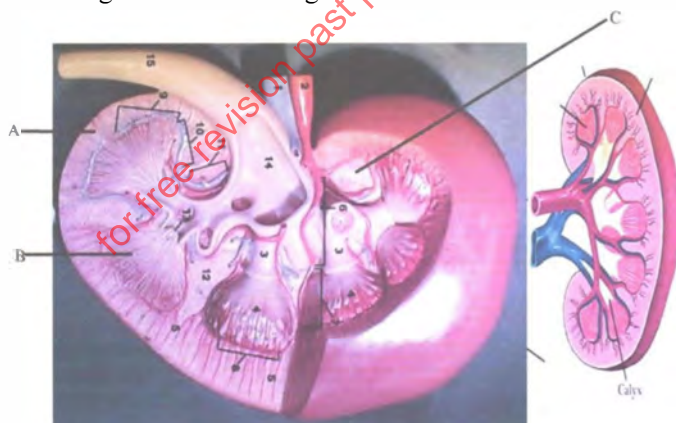
GITUAMBA LAIKIPIA**231/3****Biology****Paper 3****(Practical)****Time: 1¼ hrs****July / august 2017****CONFIDENTIAL REQUIREMENTS**

1. Pestle and mortar
2. 1 onion bulb (S) – labeled S (should have all parts) Note : roots, and aerial leaves must be present.
3. Distilled water in wash bottles.
4. Labels – 3 pieces
5. Iodine solution
6. Benedict's solution (5 mls)
7. Measuring cylinder (10 mls)
8. 1 dropper
9. 6 test tubes +
10. Test tube rack
11. source of heat
12. Test tube holder
13. 3 small beakers/containers
14. Spatular.

N/B: If available specimen S (onion bulb) is dry, place it in moist conditions for about 8 days before the exam to allow root formation and sprouting of aerial leaves.

GITUAMBA LAIKIPIA**231/3****BIOLOGY****PAPER 3****(PRACTICAL)****JUNE JULY 2017****TIME: 1¼ HOURS**

1. Below is a section through a mammalian organ



- (i) Identify the section. (1mk)
- (ii) Name the parts labeled 1, 2 and 15. (3mks)
- (iii) State **two** functions of the photographed specimen. (2mks)
- (iv) Indicate **on** the photograph where the **Glomerulus**, and **Distal Convolted tubule** are locate (2mks)
- (v) What are the differences between the organ in a kangaroo rat and tilapia? (2mks)
2. You are provided with a specimen labeled S
- (a) Classify the specimen into the following taxa
 - i) Division (1 mark)
 - ii) Class (1 mark)
 - iii) Using observable features give a reason to your answer in a(ii) above (1 mark)
- (b) Separate the aerial leaves and roots from the bulb. Using a pestle and mortar, crush the aerial leaves, bulb and roots separately.

To each crushed material add **1 ml** of distilled water. Put the extract from the materials into separate test tubes and label them. Using the reagents provided, test for the food substances in each of the extracts. Record the procedure, observation and conclusions in the table below.

(8 marks)

Extract	procedure	observation	conclusion
Aerial leaves			
Bulb			
Roots			

(c) Account for the results obtained in (b) above

(i) Aerial leaves

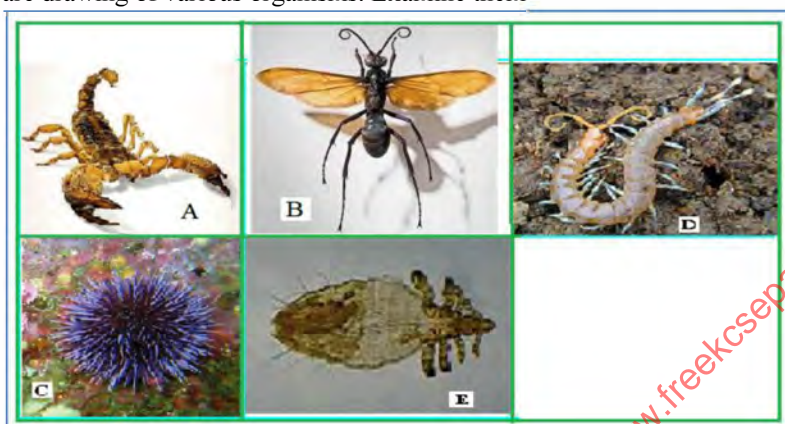
(2 marks)

(ii) Bulb

(2 marks)

(iii) Roots

3. Below are drawing of various organisms. Examine them



a) i) Name the phylum to which B belongs

(1mark)

ii) Give three reasons for your answer in (a) (i) above

(3marks)

b) Name the class to which specimen B and E belong.

c) Give three differences between specimen B and E

(3marks)

d) Use the dichotomous key provided to identify the organism.

- | | | |
|-------|--|---------------|
| 1. a) | Jointed legs present..... | go to 2 |
| b) | jointed legs absent..... | go to 7 |
| 2. a) | Have 3 pairs of legs..... | go to 3 |
| b) | Have more than 3 pairs of legs..... | go to 5 |
| 3. a) | With wings..... | go to 4 |
| b) | Without wings..... | Anoplura |
| 4. a) | Have one pair of wings..... | Diptera |
| b) | Have two pairs of wings..... | Hymenoptera |
| 5. a) | Have four pairs of legs..... | Arachnida |
| b) | Have more than 10 pairs of legs..... | go to 6 |
| 6. a) | With one pair of legs per segment..... | Chilopoda |
| b) | With two pairs of legs per body segment..... | Diplopoda |
| 7. a) | With body enclosed in a shell..... | Mollusca |
| b) | Body surface with spiny projections..... | Echnodermata. |

Identify steps followed to identify organism A, B, C, and E

(5marks)

Specimen	Steps followed	Identity
A		
B		
D		
E		

KANDARA/ MURUKA
PAPER 1
FORM FOUR BIOLOGY 232/1
END OF TERM TWO EXAM 2017

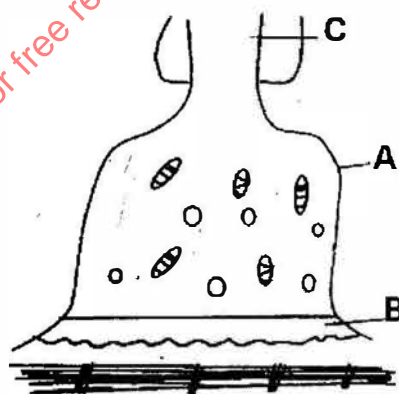
Answer all questions

1. Name the structures used for locomotion in each of the following organism
 - (a) Euglena (1 mark)
 - (b) Paramecium (1 mark)
2. (a) What is sex - linkage? (2 marks)
- (b) Name one sex- linked trait in human beings (1 mark)
3. Blackjack (bidens pilosa) belongs to the family compositae. What is the plants
 - (a) Genus (1 mark)
 - (b) Species (1 mark)
4. Name two metabolic waste products in
 - (a) Birds (2 mark)
 - (b) Plants (2 marks)
5. State the adaptations of seed to dispersal by wind (3 marks)
6. State the importance of the growth of pollen tubes in flowering plants (1 mark)
7. State three structural differences between DNA and RNA in living cells (3 marks)
8. (a) State two differences between meiosis and mitosis (2 marks)
- (b) State two processes that takes place during interphase (2 marks)
9. Name two parts in the human body with cilia (2 marks)
10. The diagram below represents a closed stoma



- (a) Identify the cells labeled A and B (2 marks)
- (b) Name the excretory product in plants which is excreted through the stomata (1 mark)
- (c) State one adaptation of the guard cell to its function (1 mark)
11. Name two organisms that form the biological environment of a malaria parasite (2 marks)
12. Name the organs of the mammalian body that are responsible for production of gametes (2 marks)
13. List three adaptations of fruits that are dispersed by animals (3 marks)
14. The equation below show what happens in cellular respiration

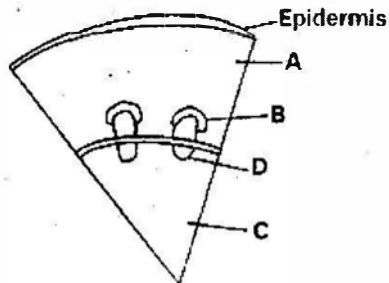
$$C_{18}H_{38} + 26O_2 \rightarrow 18CO_2 + 18H_2O + \text{Energy}$$
 - (a) Name the type of respiration shown and where it occurs in a cell (2 marks)
 - (b) Determine the respiratory quotient of the process (2 marks)
 - (c) What food substrate is broken in the respiration? (1 mark)
15. List two features of the small intestine that increase its surface area (2 marks)
- 16.



The diagram above shows synapse at a neuromuscular junction

- (a) Name the parts labeled A and B
- (b) State the function of the part labeled C
17. Explain why food is stored in an insoluble form in the cells of living things (2 marks)
18. State the observation made in germinating seeds when the
 - (a) Hypocotyle elongates
 - (b) Epicotyle elongates
19. State the differences between assimilation and absorption of food nutrients (2 marks)
20. State three homeostatic function of the liver

21. Differentiate between lactic fermentation and alcoholic fermentation (4 marks)
22. Water logging can cause the death of some plants. Explain (2 marks)
23. Distinguish between plasmolysis and haemolysis (2 marks)
24. John and grace who are siblings are both normal and so are their parents but they have a haemophilic brother. Give the genotypes of their parents. (2 marks)
25. The diagram below shows a section of a dicotyledonous stem.



Name the tissues labeled A and D and state the function of each.

26. Name the organism that causes each of the following diseases (3 marks)
- (a) AIDS
 - (b) Bilhazia
 - (c) Cholera
27. List three examples of gaseous exchanges surfaces in animals (3 marks)
28. state the significance of photosynthesis (3 marks)
29. Explain the meaning of each of the following (2 marks)
- (a) Continental drift
 - (b) Fossils
30. Green plants grow towards a source of light (1 mark)
- Name this type of response

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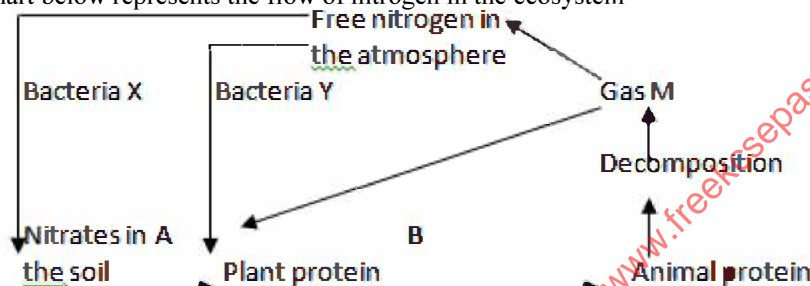
KANDARA MURUKA
BIOLOGY 231/2
FORM FOUR
END OF TERM TWO EXAM 2017
TIME 2 HOURS
SECTION A (40 MARKS)

Answer all the questions in this section

1. (a) What is gene linkage (1 mark)
- (b) Haemophilia is sex linked trait
- (i) If a normal woman but a carrier for haemophilia marries a normal man work out the phenotype of the offspring using a genetic cross. (5 marks)
- (ii) Why is haemophilia, more common defect in males than in females? (1 mark)
- (ii) Other than haemophilia state any other sex linked defect in man (1 mark)
2. The table below shows the percentage composition by volume of inhaled and exhaled air

Gas	Inhales air %	Exhales air %
Oxygen	21	16
Carbon (IV) Oxide	0.04	4.0
Nitrogen	79	79

- (a) (i) By what percentage is the carbon (IV) Oxide concentration in exhaled air higher than inhaled air? (3 marks)
- (ii) Explain the differences in the composition of the gases between inhaled and exhaled air. (3 marks)
- (b) State two ways in which leaves of plant are adapted for gaseous exchange? (2 marks)
3. The chart below represents the flow of nitrogen in the ecosystem



- (a) Name the bacteria labeled X and Y (2 marks)
- (b) Name the gas M
- (c) Name processes A, B and C
- (c) State the bacteria involved in the process named C
4. An experiment was set up to investigate the effect of unilateral light in growth of maize seedlings. The diagram in the table below represents experimental set up at the begin

Experimental set up	Beginning of experiment	Expected results
C		
D		
B		

- (a) Using diagrams complete the table to show the expected results in experimental set up. (3 marks)
- (b) Account for your results in experimental set up (3 marks)
- (c) Explain the purpose of experimental set up B and C (2 marks)
5. (a) What is internal fertilization? (1 mark)
- (b) Suggest two disadvantages of internal fertilization in most mammals (2 marks)
- (c) State two roles of placenta in mammals (2 marks)
- (d) Mention one role played by each of the following hormones in human Menstrual cycle
- (a) Follicle stimulating hormones (FSH)
- (ii) Oestrogen
- (iii) Luteinizing Hormone (LH)

SECTION B (40 MARKS)

Answer question (compulsory) in the spaces provided either question 7 & 8 in the spaces provided after question 8.

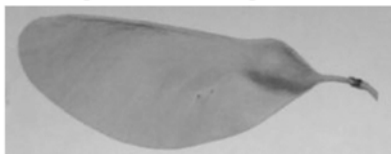
6. The following data are results of making daily growth measurement on an organism Over a period of 24 days during its development.

Day	Width of head (mm)	Length of hind femur (mm)
1.	3.0	7.0
2.	3.5	7.5
3.	4.0	8.0
4.	4.0	8.0
5.	4.0	8.0
6.	4.0	9.2
7.	4.0	10.5
8.	4.4	12.0
9.	4.7	12.0
10.	5.0	12.0
11.	5.0	12.0
12.	5.0	12.0
13.	5.0	12.0
14.	5.0	12.0
15.	5.0	13.3
16.	5.0	14.8
17.	5.7	16.4
18.	6.4	18.0
19.	7.0	18.0
20.	7.6	18.0
21.	7.6	18.0
22.	7.6	18.0
23.	7.6	18.0
24.	7.6	18.0

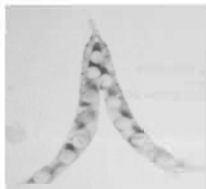
- (a) Using a suitable scale draw graphs of width of head and length of femur against time. Draw the graphs on the same axis. (8 marks)
- (b) (i) Name the growth pattern represented by the graph (1 mark)
(ii) With reference to your graph identify the phylum to which the organisms belong. Give a reason for your answer (2 marks)
- (c) Account for the length of hind femur between
(i) Day 3 and day 7 (3 marks)
(ii) Day 7 and day 10 (2 marks)
- (d) State two hormones involved in the growth pattern represented by the graphs (2 marks)
- (e) State two advantages of metamorphosis in organisms (2 marks)
7. Describe how water and mineral salts move from soil until they reach the leaves in a tall plant. (20 marks)
8. (a) Describe the following terms:
(i) Secretion
(ii) Excretion
(iii) Egestion (3 marks)
- (d) Explain how the mammalian kidney is adapted to its functions. (17 marks)

KANDARA MURUKA
BIOLOGY
PAPER 3

1. You are provided with specimen M. Photographs N, Q, U and V are fruits of different plants.



Photograph N



Photograph U



Photograph Q



Photograph V

- (a) Make a transverse section of the specimen M. State two structural similarities and two structural differences between the transverse sections of the specimens M and that in photograph v.

- (i) Similarities. (2 mks)
(ii) Differences. (2 mks)
(b) In the table below, name the mode of dispersal and one adaptive feature. (8 mks)

Specimen in photograph	Mode of dispersal	Adaptive feature
N		
Q		
U		
V		

- (c) Draw and fully label one of the cut surfaces of specimen M. (4 mks)

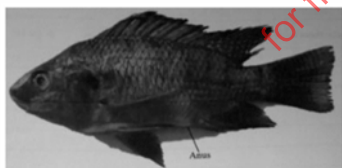
2. You are provided with a sample of food labeled B in solution form, solution C (Benedict's solution), solution D (Dilute hydrochloric acid), solution E (Sodium hydrogen carbonate solution), solution F (Copper (II) sulphate solution), solution G (Sodium hydroxide solution) and solution H (Dichlorophenolindophenol)

- (a) Use the reagents provided, carry out tests on the food sample to identify the food substance present. Record the test, procedure, observation and conclusion in the table below.

Test	Procedure	Observation	Conclusion

- (b) State the role of hydrochloric acid in the procedures of one of the tests above. (1 mk)

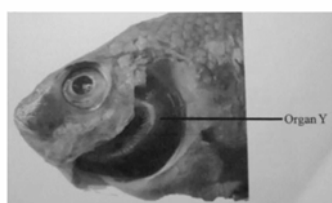
3. Below is a photograph of a certain organism. Examine it and answer the questions that follow.



- (a) Giving one observable in each case, classify the animal into the taxonomic units in the table below. (6 mks)

Taxonomic unit	Name of taxonomic unit	Feature
Kingdom		
Phylum		
Class		

- (b) The photograph below shows the organ Y, visible after removal of a certain part.

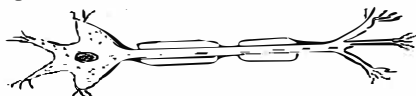


- (i) Name the part of the animal that has been removed. (1 mk)
(ii) Describe three features of the organ Y that adapt it to its function. (6 mks)

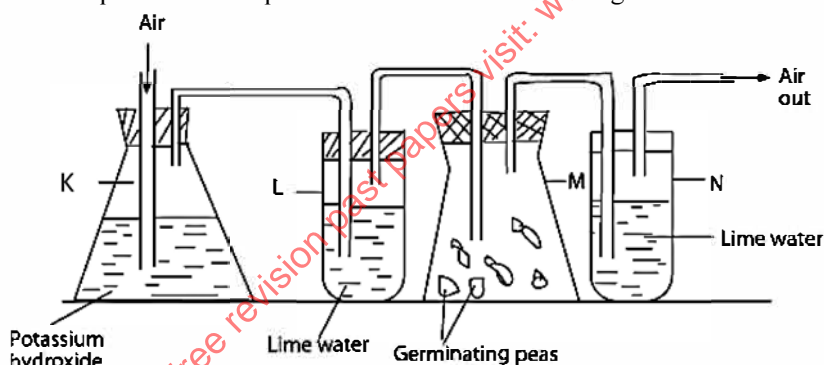
KIRINYANGA
SCHOOL BASED FORM 4 COMMON EXAM
231/1
Biology
Paper 1
Form four

Answer all the question in spaces provided marks are indicated.

1. Name the type of skeleton in:-
 - (i) Grasshopper (1mk)
 - (ii) Man (1mk)
2. Name the phylum whose members possess notochord. (1mk)
3. How is aerenchyma tissue adapted to its function. (2mks)
4. Give the structure of the cells that perform the following functions;
 - a) Synthesis of ribosomes (1mk)
 - b) Regulate exchange of substances in and out of the nucleus. (1mk)
 - c) Breakdown large molecules, destroy worn out organelles. (1mk)
5. Below is a diagram of the structure of a neurone.

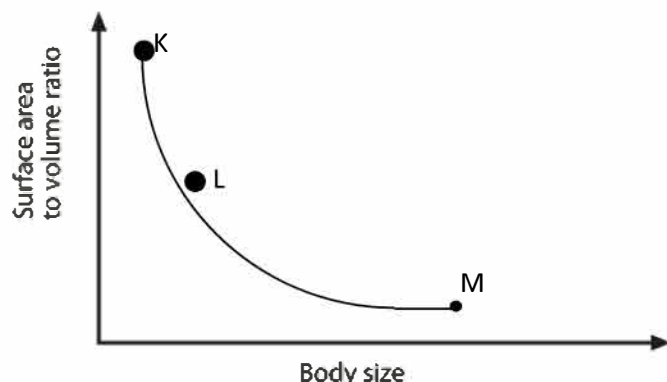


- (a) With a reason identify the neurone (2mks)
 - (b) What is the function of the neurone named above? (1mk)
6. State **three** adaptations of phloem to its function. (3mks)
7. (a) i) What is meant by a vestigial structures? (1mk)
 - ii) Give an example of a vestigial structure in human (1mk)
- (b) Explain why resistance to certain drugs in curing a disease is natural selection in action? (2mks)
8. (a) Name one salivary gland in humans. (1mk)
 - (b) State two functions of saliva (2mks)
9. (a) State the roles of enzymes catalase in living cells. (1mk)
 - (b) Which factor inactivate enzyme? (1mk)
10. The diagram below represents a set-up that students used in an investigation.

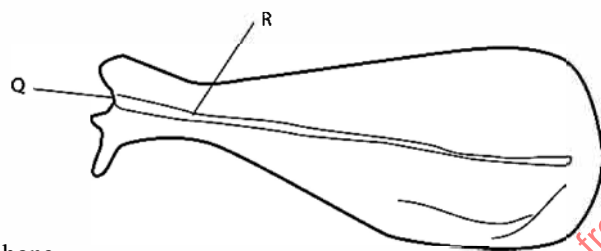


- a) Name the physiological process that was being investigated? (1mk)
 - b) State the role of potassium hydroxide in flask K? (1mk)
 - c) Give reasons for the observation in boiling tube L and flask N. (2mks)
11. Distinguish between diabetes mellitus and diabetes insipidus. (2mks)
12. Give the meaning of the following terms as used in ecology:
 - i) Synecology (1mk)
 - ii) Carrying capacity (1mk)
 - iii) Population (1mk)
13. Explain how sunken stomata lower the rate of transpiration. (2mks)

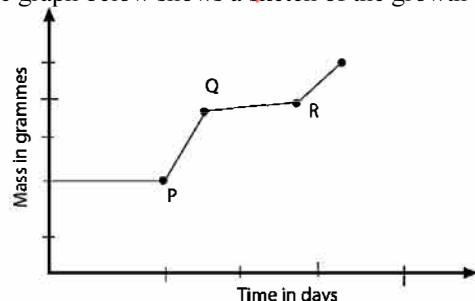
14. The graph below shows relationship between body size and surface area to volume ratio of three animals K, L, M found in the same habitat.



- State the relationship between the body size and the surface area to volume ratio. (1mk)
 - Which of the three animals is likely to have the simplest transport system. (1mk)
 - Give reasons to your answer in b(i) above. (2mks)
15. List the salient characteristics of class aves. (3mks)
16. The diagram below represents a bone obtained from a mammal;



- Name the bone. (1mk)
 - Name the:
 - bone which articulates with the bone named in (a) above at cavity labelled Q. (1mk)
 - Joint formed by the two bones. (1mk)
 - How is the bone adapted to its function. (2mks)
17. State two structural differences between the glomeruli of a desert mammal and a fresh water fish. (2mks)
18. State two functions of the choroid in the human eye. (2mks)
19. A student drew a 5cm long diagram of a plant flower. If the actual length of flower was 10cm calculate the magnification of the drawing made by students. Show your working. (3mks)
20. Hemophilia is sex-linked trait. It is caused by a recessive gene on the X-chromosome. Using the symbol H – to represent the normal gene and h to represent the gene for hemophilia work out the following; The phenotypes of children born to or normal man and carrier woman. (5mks)
21. State the importance of the following features in gaseous exchange.
 - Presence of cartilage in trachea. (1mk)
 - Large surface area of the lungs. (1mk)
22. The graph below shows a sketch of the growth of an insect.



- Name the type of growth represented by the curve shown above. (1mk)
 - Give reasons for the steps of the curve between;
 - P and Q. (1mk)
 - Q and R. (1mk)
23. Give the role of the following parts of the male reproductive system. (3mks)
- Epididymis
 - Prostrate gland.
 - Scrotum

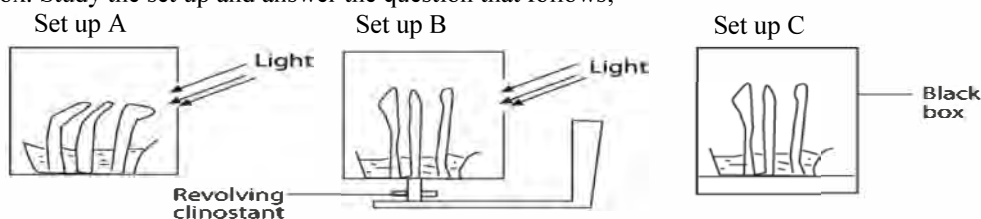
-
24. State two functions of the cerebrum of the brain. (2mks)
25. State three industrial application of anaerobic respiration. (3mks)
26. Give two reasons why productivity in the aquatic ecosystem decrease with depth. (2mks)
27. What causes seed dormancy in a seed. (2mks)
28. a) Name the factor that enhance water re-absorption in the distol convoluted tubule. (2mks)
- b) Name three nitrogenous waste found in urine. (3mks)

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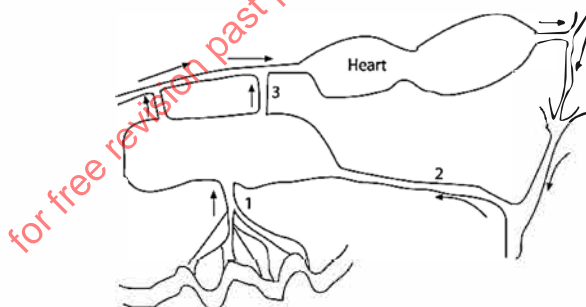
KIRINYAGA
SCHOOLBASED FORM IV JULY/AUGUST 2017 EXAMINATION
231/2
BIOLOGY PAPER 2
(THEORY)
TIME: 2 HOURS
SECTION A (40 Marks)

Answer all questions in this section in the spaces provided.

1. A form 4 class set up an experiment as shown in the diagram below. All the three set ups had growing maize seedlings in a box. Study the set up and answer the question that follows;

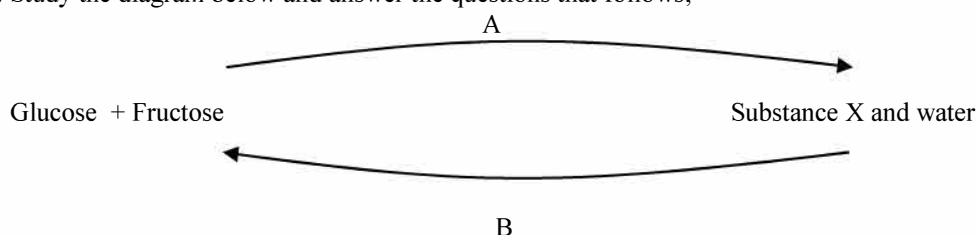


- (a) Suggest the aim of the experiment. (1mk)
- (b) i) Account for the result shown in the set up A. (2mks)
 ii) What was the purpose of the revolving clinostat in set up B. (1mk)
- (c) i) Name the phenomenon exhibited by set up C results. (1mk)
 ii) What is the significance of the phenomenon named in C (i) above. (1mk)
- (d) Differentiate between conditioned and simple reflex action. (2mks)
2. (a) What are the multiple alleles? (1mk)
- (b) A pure black male mouse was mated with a pure breeding brown female mouse. All the offspring had black coat colour.
- i) Explain the appearance of black coat colour in the offsprings. (1mk)
- ii) If the black parented mouse was mated with a mouse that is heterozygous for coat colour, work out the genotypic ratio of offspring. Show your working. (4mks)
- iii) State two disorders in human being that are as a result of chromosomal mutation. (2mks)
3. In an attempt to estimate the number of weaver birds in a small woodland 435 were captured marked and released. Three days later 620 were captured 95 of which weremarked.
- a) What is the name of the sampling method described above? (1mk)
- b) Calculate the approximate size of the weaver bird population in the woodland. (2mks)
- c) What two assumptions must be made during this investigation. (2mks)
- d) List three other methods that can be used to estimate the number of organisms in a given habitat. (3mks)
4. The figure below is a simplified diagram of a mammalian circulatory system. Study it and answer the question that follows;



- a) Explain why the level of blood sugar in vessel 3 would be higher than that in vessel 1 during fasting (2mks)
- b) Name the vessel that has the highest concentration of urea among vessels labeled 1, 2, and 3 (1mk)
- c) In what way does blood vessel 1 differ from most of the other blood vessel in the body? (1mk)
- d) Name three nutrients that are only transported in vessels 1 following absorption. (3mks)
- e) Why is it necessary that blood from digestive tract pass through the liver before entering the general circulation? (1mk)

- 5 a) Study the diagram below and answer the questions that follows;



- i) Name the identity of process B (1mk)
- ii) Which part of the mammalian body does process B occur? (1mk)

- iii) Give the identity of substance X _____ (1mk)
 iv) Name the enzyme involved in process B _____ (1mk)
 b) Briefly describe the light stage of photosynthesis. (4mks)

SECTION B (40marks)

Answer question 6 (Compulsory) and either question 7 or 8 in the spaces provided.

6. A man carried out an experiment to find out the effect of water and 0.9% salt solution on urine production. On the first day, he drank one litre of water (X). On the second day, he repeated the experiment, but instead of water, he drank one litre of 0.9% salt solution (Y).

The experimental results are shown in the table below.

Time in (hrs)		0.0	1.0	1.5	2.5	4.5	5.5	6.5	7.5
Amount of Urine produced In cm ³ per hour	X	80	60	360	520	60	100	40	60
	Y	40	40	40	45	100	60	80	100

- a) Using a suitable scale draw graphs of urine produced in cm³ per hour against time. (8mks)
 b) From the graph determine the;
 i) Amount of urine produced in the second hour when the man had drunk solution X. (1mk)
 ii) The rate of urine production between the first and second hour after the man had drunk one litre of water. Show your working. (2mks)
 c) What does the shape of the curve representing column X tell us about the rate of urine production? (2mks)
 d) Explain the differences between the rate of production in graph X and Y. (2mks)
 e) Why do you think drinking one litre (0.9%) of sodium chloride solution made little difference to the output? (1 mk)
 f) Name two hormones involved in regulation of osmotic pressure in kidney. (2mks)
 g) Name two kidney diseases (2mks)
 7 a) Describe adaptations of the reproductive system of a male mammal to its function. (10mks)
 b) Describe the following evidences of evolution:
 i) Comparative anatomy (6mks)
 ii) Cell biology (2mks)
 iii) Comparative embryology (2mks)
 8 Describe the structure and functions of various organelles in a mature animal cell. (20mks)

KIRINYAGA**SCHOOL BASES FOUR EXAMINATION JULY/AUGUST 2017****Biology confidential instructions to schools****Each candidate will require the following:**

- 10ml of lemon juice labeled K.
 - 10m. of pineapple labeled L.
 - 10ml of tomato juice labeled M.
- NB K, L, M are prepared by peeling and crushing the fruit to obtain concentrated solution of each fruit juice. Do not add water to the juices.
- 5ml of DCPIP
 - 5ml of olive oil labeled Q
 - Four clean empty test tubes.
 - Four droppers
 - Means of drying.

SCHOOL BASED FORM 4 COMMON EXAM**Kenya Certificate of Secondary Education (K.C.S.E)****231/3****BIOLOGY****PAPER 3****(PRACTICAL)****TIME: 1³/₄ HOURS**

- You are provided with 3 fruits juices. Labelled K, L and M. Put 2cm³ or DCPIP solution in each of the three test tubes provided and label the test tubes K, L2 and M3. Add solution K drop wise into the test tube labeled K1, count and record the number of drops that completely de-colourises the DCPIP in the table below. Repeat the procedure using solution L and M with test tube L2 and M3 respectively.

Solution	Number of drops
K	
L	
M	

- Arrange the solutions K, L and M according to their ascorbic acid concentration starting with the most concentrated. (1mk)
 - What is the effect of boiling the above solutions. (1mk)
 - Apart from fruits, give other source of vitamin C. (1mk)
 - Name two deficiency symptoms of vitamin C. (2mks)
 - Using the filter paper provided, test for the food substance present in solution. Q
- Procedure (2mks)
- Observation (1mk)
- Conclusion (1mk)

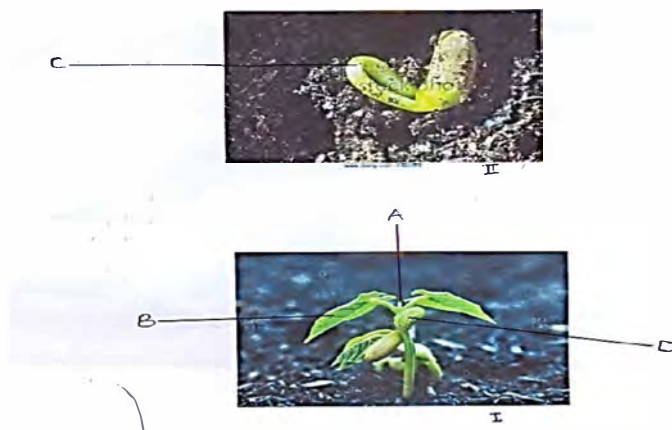
- The photographs below shows two organs labeled X and Y obtained from the same mammal.



(i) Identify the two organs

- Identify the two organs X and Y (2mks)
 - Give one reason for the identity of organ labeled X in (a) (i) above. (1mk)
- Photograph X1 is the longitudinal section of organ labeled X. Name the parts labeled A, B and C. (1mk)
- Name the substance contained in the structure labeled Z in organ labeled Y (1mk)
 - State two functions of substance you have identified in (d) (i) above. (2mks)
- Give two homeostatic functions of the organ labeled Y. (2mks)
- Name one disease that affects organs labeled X and Y (2mks)

3. Examine the photographs I and II of seedling specimen shown below and answer the questions that follows;



- (a) Name the parts labelled A, C and D. (3mks)
- (b) (i) Name the class to which the specimen belongs. (1mk)
- (ii) Give two reasons, using observable features to support your answer in (b) (i) above (2mks)
- (c) Give two functions of the structure labeled D. (2mks)
- (d) Explain how the curvature labeled C is formed (3mks)
- (e) Name the type of germination exhibited by the seedlings. Give a reason for your answer. (2mks)
- Type
- Reason

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WESTLANDS GRAPHICS
FORM 4 END OF TERM 2 EXAM 2017

231/1

BIOLOGY

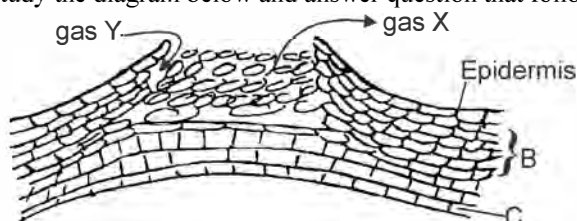
Paper 1

(Theory)

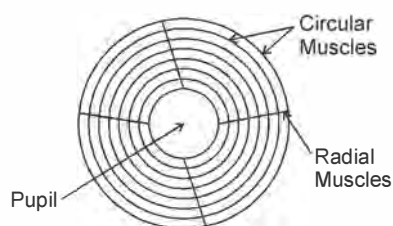
July 2017

Time: 2 Hours

1. a) Name the organ where sugar regulation occur. (1 mark)
b) State two hormones concerned with sugar regulation. (2 marks)
2. Name two classes under the phylum chordata that secrete nitrogenous waste in form of uric acid. (2 marks)
3. A blood group A mother gave birth to a blood group O child with a blood group B husband.
a) State the genotypes of the parents. (2 marks)
b) What was the genotype of the child? (1 mark)
c) State other blood groups likely to occur in the children of the couple? (1 mark)
4. a) Distinguish between monoecious and dioecious conditions in plants. (2 marks)
b) Name the parts of the flower that are responsible for the production of gametes. (2 marks)
5. State what happens to the end products of photosynthesis. (3 marks)
6. a) Name the blood vessel that convey blood to the
i) Hind limb (1 mark)
ii) Kidney (1 mark)
iii) Brain (1 mark)
7. What is the importance of the following in an ecosystem ?
i) Bacterial and fungi (1 mark)
ii) Predators (1 mark)
8. Study the diagram below and answer question that follow.



- a) Identify the structure shown in the diagram above. (1 mark)
- b) Identify :
i) Part B (1 mark)
ii) Part C (1 mark)
iii) Gas X (1 mark)
9. State the uses of the following apparatus during ecological studies.
a) A pair of forceps (1 mark)
b) Pitfall trap (1 mark)
10. Explain the meaning of the following terms:
a) Osmotic pressure (2 marks)
b) Osmotic potential (2 marks)
11. State the functions of the following hormones in human.
i) Interstitial cell stimulating hormone in males (2 marks)
ii) Oxytocin (2 marks)
12. Diagram below shows a section of the iris of the eye when in bright light. (3 marks)



- a) State the changes that occur in the iris when one moves from such and enters a dark room. (1 mark)
- b) What is the significance of the changes in (a) above ? (1 mark)
13. Name the organelle that would be abundant in :
a) Apical meristem (1 mark)
b) Intestinal epithelial cell (1 mark)

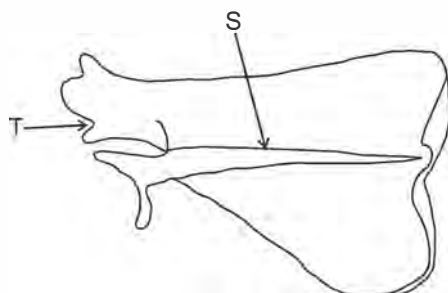
14. State the role of the following structures in dicotyledonous plants. (2 marks)

- Endodermis
- Vascular cambium

15. a) Give two examples of genetic disorder caused by non-disjunction. (2 marks)

- What would be the expected results from a test cross ? (2 marks)

16. The diagram below shows a certain bone.



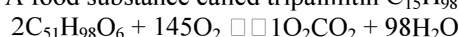
- Name the bone. (1 mark)
- What are the functions of parts labelled S and T. (2 marks)

17. State two functions of saliva. (2 marks)

18. In prolonged drought period forage was scarce. It made animals reach out for higher forage and this way the giraffes got the stretched long necks.

- What is the term used for a characteristic such as the long necks outlined. (1 mark)
- What is the name given to the theory that describes the evolution of such structures like the long neck ? (1 mark)
- Explain the limitation of the theory you name in (b) above. (2 marks)

19. A food substance called tripalmitin $C_{51}H_{98}O_6$ was oxidised fully and the following equation worked out.



- Calculate the RQ of the tripalmitin. (3 marks)
- From the RQ value obtained above, to what group of food substance does tripalmitin belong? (1 mark)

20. a) Name two enzymes in the alimentary canal which are secreted in their inactive form. (2 marks)

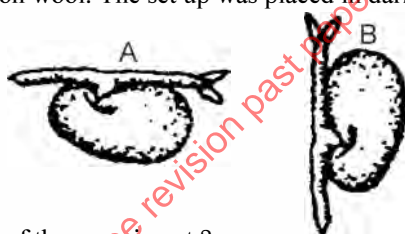
- Why are the enzymes named in (a) above secreted in inactive forms. (1 mark)

21. Explain how concentration of carbon (IV) oxide affect of photosynthesis. (2 marks)

22. a) Why is a change in dry mass of an organism the best indicator of growth. (2 marks)

- What are the limitations of dry mass measurements in assessing growth ? (1 mark)

23. A student set up an experiment as shown in the diagram below to investigate a certain phenomenon. The petri dish contained moist cotton wool. The set up was placed in darkness left for 24 hours.



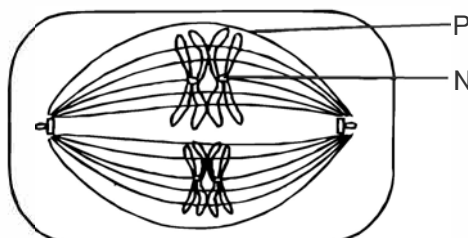
- What is the aim of the experiment ? (1 mark)
- State the expected results after 24 hours. (2 marks)

24. a) Name two supportive tissue in young dicotyledonous plants. (2 marks)

- Explain how the tissues named in (a) above are adapted for the function. (2 marks)

25. How does excretion take place in plants ? (4 marks)

26. The diagram below represents a stage during cell division.



- Identify the stage of cell division. (1 mark)
- Give one reasons for your answer in (a) above. (1 mark)

27. In fish water and blood flow in opposite direction across the gills.

- Give the term used to describe this flow. (1 mark)
- Name two organs in man which display the flow system named in (a) above. (2 marks)

WESTLANDS GRAPHICS
FORM 4 END OF TERM 2 EXAM 2017

231/2

BIOLOGY

Paper 2

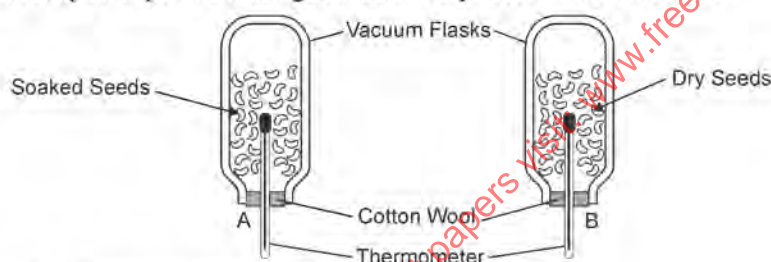
(Theory)

July 2017

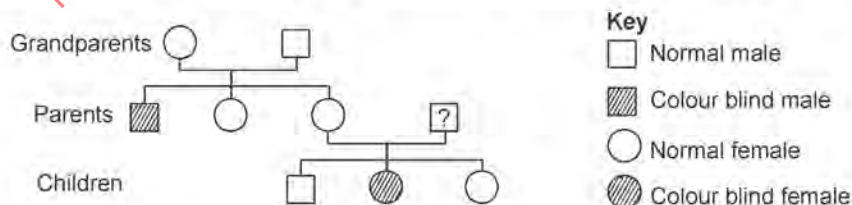
Time: 2 Hours

SECTION A : (40 MARKS)

- 10cm³ of yeast suspension were added to 10% glucose solution in a boiling tube. The boiling tube was stoppered with cork having a delivery tube immersed in a test tube containing clear lime water.
 - State the changes observed in:
 - The test tube with lime water. (1 mark)
 - The glucose yeast mixture (1 mark)
 - What was the role of yeast in the experiment? (1 mark)
 - Name the products of :
 - Anaerobic respiration in mushroom. (1 mark)
 - Breakdown of lactic acid in muscles (1 mark)
 - Write an equation for:
 - Glycolysis (1 mark)
 - Fermentation (1 mark)
 - Name the site of anaerobic respiration in a cell. (1 mark)
- Ascaris lumbricoides* is an endoparasite.
 - Name the genus to which it belongs. (1 mark)
 - State the habitat of the organism. (1 mark)
 - State three ways in which the organism is adapted to living in its habitat. (3 marks)
 - Mention three ways of preventing spread of the parasite. (3 marks)
- A student set up an experiment using soaked and dry seeds as shown below.



- State the objective of this experiment. (1 mark)
 - State the observations made in each of the flask after 24 hours. (2 marks)
 - Account for the observation made in (b) above. (2 marks)
 - Suggest why vacuum flasks were used in the experiment. (1 mark)
 - Why would the seed be washed with antiseptic solution ? (2 marks)
- The figure below is a pedigree chart showing the incidence of colour blindness, a disease that is transmitted through a recessive gene carried by the X chromosome. Study the diagram and answer the questions that follow.



Using letter T to represent the gene for normal vision and letter t for colour blindness.

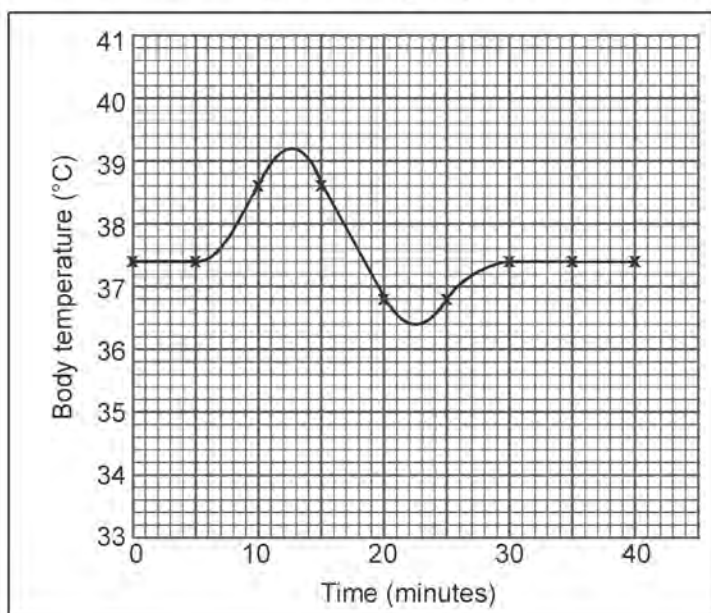
- Write down the genotypes of the grand parents. (2 marks)
 - Work out the genotypes of the parents using punnet square. (3 marks)
 - Explain why sex-linked disorders are more common in males than in females. (2 marks)
- A Form one student split a straight piece of stem from a herbaceous plant lengthwise into two similar pieces. One of the pieces was placed in a hypotonic solution and the other in a hypertonic solution in petri dishes for about 30 minutes.
 - Make diagrams to show the appearance of the two pieces after 30 minutes in:
 - Hypotonic solution (1 mark)
 - Hypertonic solution (1 mark)
 - Account of the appearance in the two pieces placed in (a) above. (3 marks)

Hypertonic solution

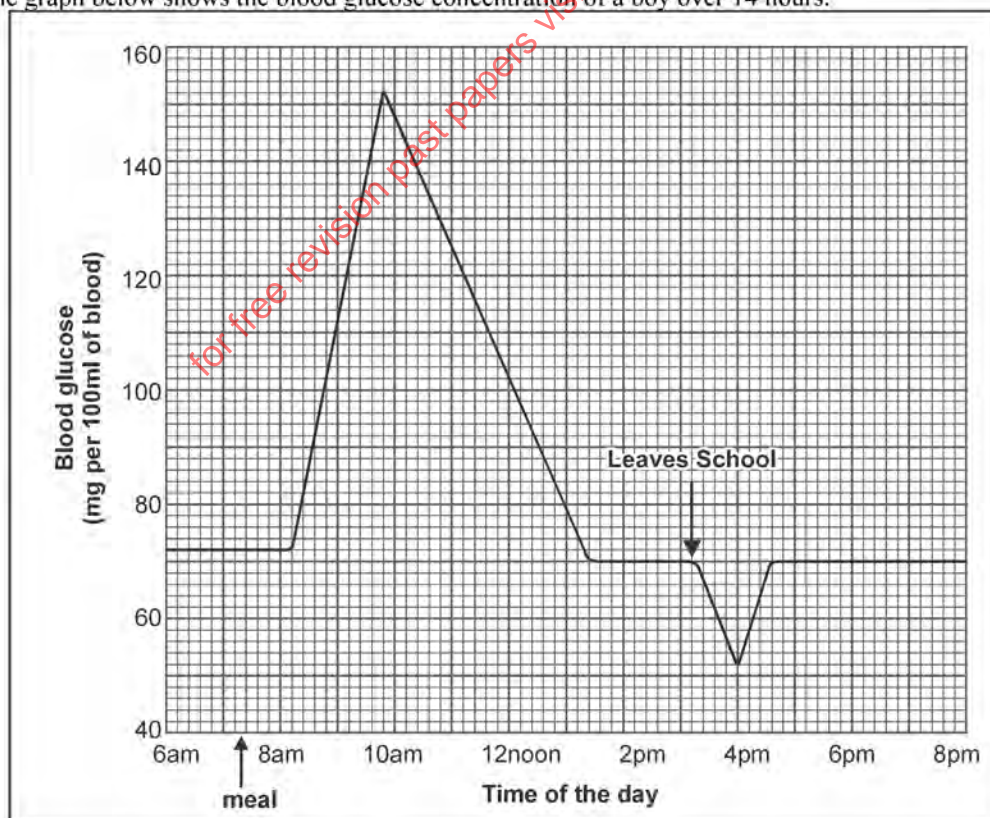
(3 marks)

SECTION B : (40 MARKS)**Answer question 6 (compulsory) and either question 7 or 8 in the spaces provided.**

6. The graph below shows changes in a person's body temperature before, during and after a period of exercise.



- a) i) Using information from graph state the normal body temperature of this person. (1 mark)
 ii) On the graph label with an X point when vasodilation is having an effect on the person's body temperature. (1 mark)
- b) i) Explain the changes that occurred in the person's body that enabled the body temperature to return to normal after the exercise. (1 mark)
 ii) Name the term that is used to describe the maintenance of a constant body temperature. (1 mark)
 iii) State two advantages of a mammal of maintaining a constant body temperature. (2 marks)
- c) The graph below shows the blood glucose concentration of a boy over 14 hours.



The boy had a meal at about 7.45a.m

- i) What was the boy's blood glucose concentration before this meal.

(1 mark)

- ii) What was the boy's maximum blood glucose concentration after this meal. (1 mark)
- d) After the meal the boy's pancreas secreted a hormone that helped to remove excess glucose from the blood and store it. (1 mark)
- i) On the graph mark with letter G when the pancreas started to secrete the hormone. (1 mark)
- ii) State the form in which glucose is stored in the body. (1 mark)
- iii) State one organ in the body where this storage occurs. (1 mark)
- e) On the way home from school the boy was involved in a fight. (1 mark)
- i) State what happened to the boy's blood glucose concentration at the start of the fight. (1 mark)
- ii) During the fight the boy's body produced another hormone which prepared him for the fight. Name the hormone. (1 mark)
- iii) State three effects this hormone had on the boy's body. (3 marks)
7. a) Explain the role of mammalian placenta. (7 marks)
- b) Describe how hormones regulate the menstrual cycle in human female. (13 marks)
8. a) Explain how structural features in terrestrial plants affect their rate of transpiration. (14 marks)
- b) Explain how the features in xylem vessels make them efficient in transport of water and minerals salts. (6 marks)

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WESTLANDS GRAPHICS
FORM 4 END OF TERM 2 EXAMS 2017
BIOLOGY

Paper 3
 July 2017

CONFIDENTIAL INSTRUCTIONS

Requirements :

Each candidate requires:

1. About 2ml of solution labelled L - enzyme diastase served with a dropper
2. 3 labels
3. 3 test tube
4. Thermometer
5. Access to a water bath
6. White tile
7. Iodine solution + a dropper
8. Benedict's solution + a dropper
9. 0.05% sodium chloride
10. 1.4% sodium chloride
11. Measuring cylinder
12. About 4ml starch solution
13. Specimen P₁ - Hibiscus
 Specimen P₂ - Tradescantia
 Specimen P₃ - Bouganvillea
 Specimen P₄ - Mango
 Specimen P₅ - Solanum
 Specimen P₆ - Grass

WESTLANDS GRAPHICS
FORM 4 END OF TERM 2 EXAM 2017

231/3

BIOLOGY

Paper 3
 July 2017

Time: 1³/₄ Hours

1. You are provided with solution L, starch solution and sodium chloride in two different concentrations 0.05% and 1.4%. Place 3ml of starch solution in test tubes labelled 1, 2 and 3. Add 3 drops of 0.05% sodium chloride to the test tube labelled 2 and 3 drops of 1.4% sodium chloride to the test tube labelled 3. Add 3ml of solution L to each of the test tube labelled 2 and 3.
- a) Place a drop of the contents from each test tube 1, 2 and 3 on a white tile. To each drop add iodine solution. Record your results in the table below. (3 marks)

Test tube	Observations at start of experiment	Observation at end of experiment
1		
2		
3		

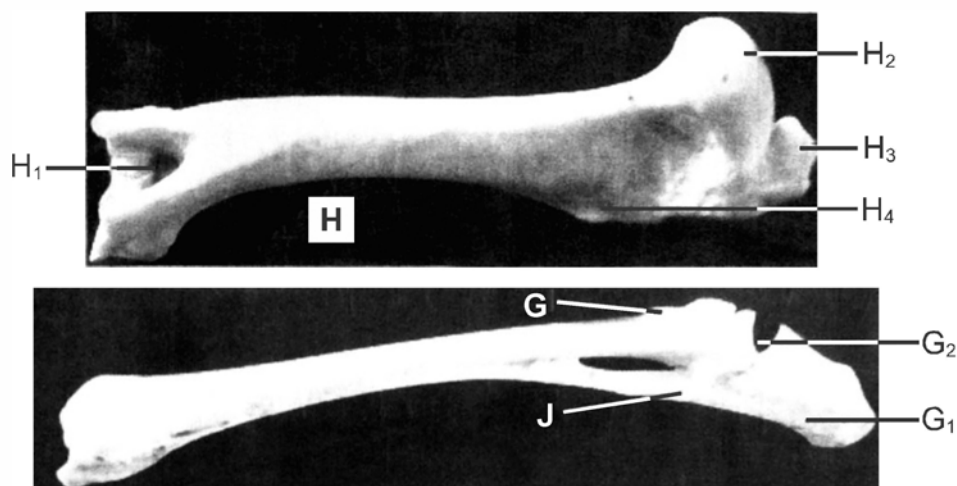
- b) Place the test tubes in a water bath maintained at 37°C allow to stand for 30 minutes. Place drop of the contents from each test tube on a white tile. To each drop iodine solution. Record your observation in the table above. (3 marks)
- c) Add equal amount of the Benedict's solution to test tubes labelled 2 and 3, boil.

	Record your observation.
Test tube 2	
Test tube 3	

(1 mark)

- d) Why was the test tube labelled 1 included in the experiment ? (1 mark)
- e) Account of the results in tubes 1, 2 and 3. (4marks)
- f) Suggest the identity of solution L. (1 mark)
- g) Why were the test tubes placed in water bath maintained at 37°C. (1 mark)

2. You are provided with photographs of specimen J, H and G.



- a) Name the specimens labelled J, H and G. (3 marks)
- b) Which part of mammal's body were the specimens J, H and G obtained from. (2 marks)
- Specimen G and J
Specimen H
- c) Name the parts labelled as G₁, G₂ and H₂ (3 marks)
- d) i) Name the type of joint formed at the proximal end of specimen H. (1 mark)
- ii) Give a reason for your answer in d(i) above. (1 mark)
- e) State two functions of the part labelled G₁ (2 marks)
3. You are provided with specimen labelled P₁, P₂, P₃, P₄, P₅ and P₆. The dichotomous key shown below can be used to identify them.

1. a) Leave simple go to 2
- b) Leaves compound Cassia
2. a) Leaves green go to 3
- b) Leaves purple Tradescantia
3. a) Leaves parallel veined Zea
- b) Leaves not veined go to 4
4. a) Leaf margin serrated go to 7
- b) Leaf margin smooth go to 5
5. a) Leaves hairy Solanum
- b) Leaves not hairy go to 6
6. a) Leaves orate Bougainvillea
- b) Leaves lanceolate Mangifera
7. a) Leaves fleshy go to 8
- b) Leaves not fleshy Hibiscus
8. a) Leaves with pointed tips Kalanchoe
- b) Leaves with rounded tips Bryophyllum

- a) Use the dichotomous key to identify specimens P₁, P₂, P₅, P₆ provided. In each case show in sequence the steps in the key that you followed to arrive at the identity of the specimen. (8 marks)

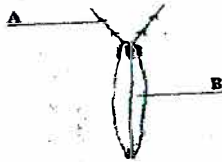
Specimen	Steps followed	Identity
P ₁		
P ₂		
P ₅		
P ₆		

- b) i) Name the likely habitat for specimen P₁ (1 mark)
- ii) Give a reason for your answer in b(i) above. (1 mark)
- c) State the significance of the shiny upper surface of specimen P₄ (2 marks)
- d) Observe floral parts of specimen P₃. What is the significance of the brightly coloured structures onto which the flowers are attached. (1 mark)
- e) Name one feature that make specimen P₅ adapted to its environment. (1 mark)

SUNSHINE SECONDARY SCHOOL
BIOLOGY 231/1
PAPER 1

1. Name the hormone that is responsible for the development of a deep voice in humans. (1 mk)
2. What is Synecology. (1 mk)
3. Name the bacteria found in the root nodules of leguminous plants. (1 mk)
4. In which part of the cell does each of the following processes take place? (2 mks)
 - (a) Glycolysis
 - (b) Krebs cycle
5. Name the structure used for excretion in fresh water protozoa. (1 mk)
6. State two mechanisms of excretion in terrestrial green plants. (2 mks)
7. Name the gamete cells that are produced by ovaries. (1 mk)
8. Name three abiotic factors in a soil ecosystem. (3 mks)
9. Define facultative anaerobe. (1 mk)
10. What is meant by single circulatory system? (1 mk)
11. What is meant by a test cross in genetics? (2 mks)
12. Give the scientific name of the bacterium that causes tuberculosis in humans. (1 mk)
13. (a) Name two chemicals that undergo no digestion. (2 mks)
 (b) Explain why the chemicals named in (a) above undergo no digestion? (1mk)
14. Which part of the ovule forms the following structures after fertilization? (2 mks)
 - (a) Zygote
 - (b) Testa
15. The process by which living organisms take oxygen into their bodies and release carbon (VI) oxide into the environment is called? (1 mk)
16. Name three requirements of a plant to carry out photosynthesis (3 marks)
17. The branch of biology that deals with the study of structure of living things that can be seen by the unaided eye when the animal is dissected is called? (1 mk)
18. Give one advantage of internal fertilization e.g. in humans. (1 mk)
19. Give the importance of mosaic leaf arrangement. (1 mk)
20. State 3 features that a grasshopper, a crab and a spider have in common. (3 mks)
21. Name one plant circulatory product that is harnessed and used as a local anesthetic. (1 mk)
22. State the importance of each of the following features of the mammalian ileum.
 - (a) Highly coiled. (1 mk)
 - (b) Long (1 mk)
23. State two ways in which food is mechanically digested in a mammal. (2 marks)
24. The body cells of an organism contain two copies of 24,000 genes i.e. 48,000 genes in total of these. How many genes would have been inherited from the organism's female parent? (1 mk)
25. Besides direct drinking, name other sources of water in nutrition of man. (2 mks)
26. State the importance of the following features of mammalian lungs.
 - (a) Spongy and elastic (1 mk)
 - (b) Pleural fluid (1 mk)
27. Give the term used to describe the following organelle/features of cells.
 - (a) They become visible only when the cells are dividing. (1 mk)
 - (b) A term which means "made of many cells" (1 mk)
28. Give 2 reasons why humans (*Homo Sapiens*), unlike garden peas (*Pisum Sativum*) are not convenient subject for genetic studies. (2 mks)
29. Identify each of the genetic disorders in man, characterized by the symptoms described in (a) below.
 - (a) Inability to distinguish between blue and green colour and various shades of red. (1 mk)
30. State two roles of osmosis in plants. (2 mks)
31. (a) It was found that during germination of pea seeds, 9.00cm^3 of oxygen was used while 9.2cm^3 of carbon (IV) oxide was produced. Calculate the RQ. (3 mks)
 (b) Identify the food substance that was metabolized. (1 mk)
32. (a) Under what conditions is carboxyhaemoglobin formed in the human body. (1 mk)
 (b) Why does accumulation of carboxyhaemoglobin cause death? (2 mks)
33. Give 2 functions of each of the following structures in the human reproductive system.
 - (a) Epididymis. (2 mks)
 - (b) Oviduct (2 mks)
34. To estimate the population of tilapia using the recapture method, 60 fish were captured and released. In the second capture, out of 72 fish, 10 had been marked. Calculate the estimated population of tilapia. (Show your working) (3 mks)
35. What is the function of the following part in a microscope? (2 mks)
 - (a) Condenser
 - (b) Diaphragm
36. What is the importance of roughage in a diet. (1 mk)
37. (a) State the role of the vestibular apparatus. (1 mk)

- (b) Name the smallest ear oscicle (1 mk)
38. State the significance of meiosis (2 mks)
39. (a) What is meant by biological control? (1 mark)
- (b) Give two examples of biological control. (2 mks)
40. The wings of a bird and that of insects are analogous structures
- (a) What are analogous structures? (2 mks)
- (b) Name this type of evolution. (1 mk)
- (c) Name a vestigial structure found in man. (1 mk)
41. The diagram below shows a fruit specimen dispersed by a certain agent. Study the diagram carefully and then answer the questions that follow.

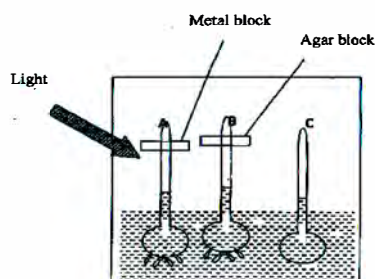


- (a) What type of fruit is represented by the diagram below? (1 mk)
- (b) Name each of the parts labeled A & B (2 mks)
- (c) Name the agent of dispersal of the fruit. (1 mk)

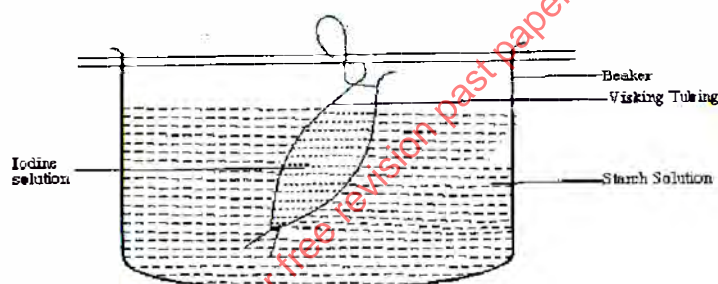
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SUNSHINE SECONDARY SCHOOL
Kenya Certificate of Secondary Education
BIOLOGY 231/2
PAPER 2

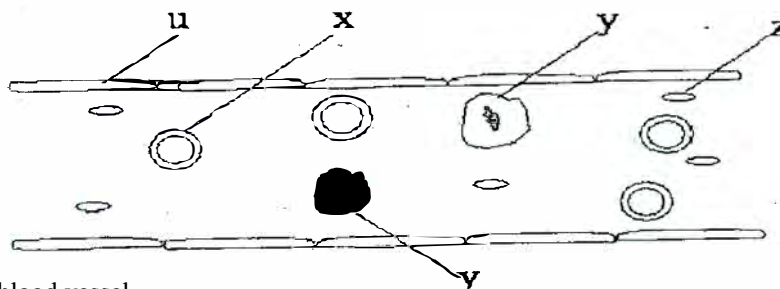
1. A man with normal colour vision marries a colour blind woman. The first children were daughters all with normal colour vision. The two sons were colour blind.
 - (a) (i) State the location of the gene for colour vision. (1 mark)
 - (ii) Using a punnet square, work out the possible genotypes of their children. Use B to represent the gene for normal colour vision. (4 mks)
 - (b) Name another trait in humans inherited in the same way. (1 mk)
 - (c) Explain one importance of genetic counseling (1 mk)
 - (d) State two causes of mutation in man (1 mk)
2. Pea seedlings were treated as follows:
 Seedling A – Coleoptile tip was cut off, metal block placed, then tip placed back
 Seedling B – Coleoptile tip was cut off, agar block placed then tip placed back.
 Seedling C – was left intact
 The seedlings A, B and C were placed in a dark box with a small hole at one side as illustrated in the diagram below.



- (a) State what was being investigated in the set up above. (2 mks)
 - (b) Using diagrams illustrate how the seedlings A and B appear after 48 hours? (2 mks)
 - (c) Explain the results in (b) above (1 mk)
 - Seedling A
 - Seedling B
 - (d) Explain why seedling C was included in the set up (1 mk)
3. Below is a set up showing a certain physiological process.

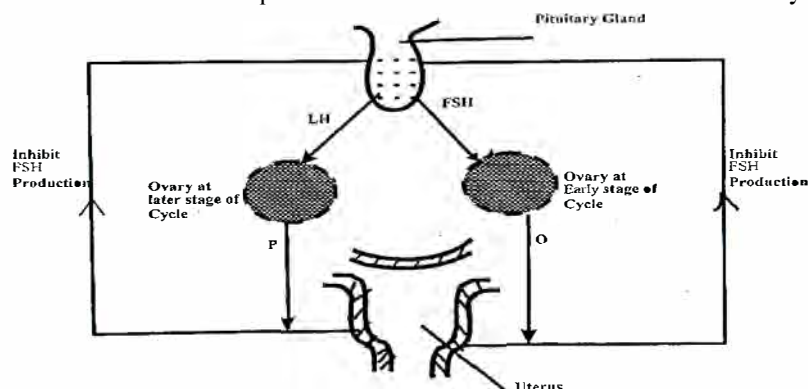


- (a) Identify the process (1 mark)
 - (b) Explain the observation made after 10 minutes (4 mks)
 - (c) Outline 3 roles of active transport in the human body (3 mks)
4. The following is an illustration showing a blood vessel. Study it then answer the questions below.



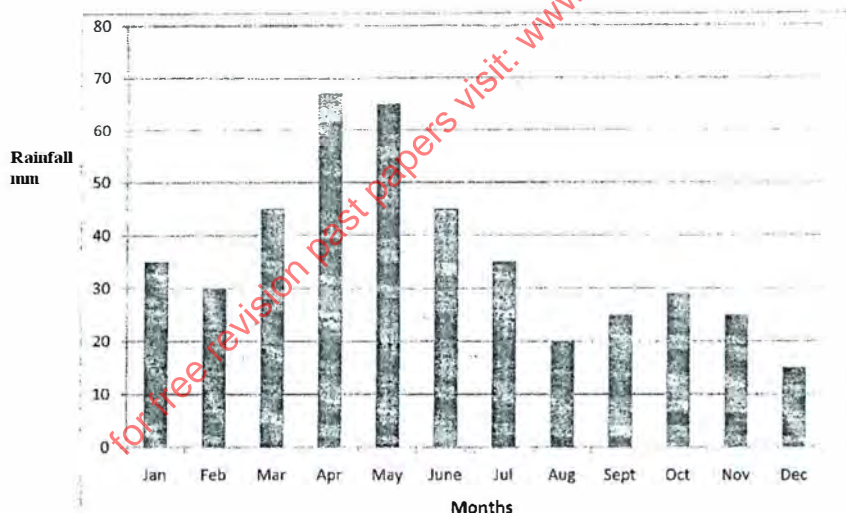
- (a) Identify the blood vessel (1 mk)
- (b) How is the blood vessel named in (a) above adapted to its functions. (2 mks)
- (c) Name the cells labeled X, Y and U (3 mks)
- (d) State the function of the cell labeled Z (1 mk)
- (e) Name the fluid in which cells X, Y and Z are suspended. (1 mk)

5. The diagram below shows the relationship between four hormones involved in menstrual cycle.



Key
 FSH – Follicle stimulating hormone
 LH – Leutenising
 O – Oestrogen
 P – Progesterone

- (a) Both oestrogen and progesterone affect the uterus during the menstrual cycle. State the effects each has on the uterus. (2 mks)
- (i) Oestrogen
 (ii) Progesterone
- (b) What effects does FSH have on the early stage of the menstrual cycle (2 mks)
- (c) Where in the ovary is progesterone formed? (1 mk)
- (d) One type of contraceptive pill contains both oestrogen and progesterone. Explain briefly how such pills prevent conception. (1 mk)
- (e) Where else is the hormone progesterone produced and at what time? (2 mks)
6. A group of students investigated the relationship between the rainfall pattern in a terrestrial ecosystem and the population of the two animal species M and P for one year. The results for the rainfall recorded monthly were plotted in the bar graph below while the animal population were recorded in the table below.



Month	J	F	M	A	M	J	J	A	S	O	N	D
Population of species N	600	350	500	1200	1800	1700	1200	650	450	710	1300	1200
Population of species P	810	400	120	320	790	1220	1420	1000	520	200	400	880

- (a) Using appropriate scale, plot two curves of animal species populations against time, on the same Axis (8 mks)
- (b) (i) What is the relationship between rainfall pattern and changes in the population of species N? (2 mks)
 (ii) Account for the relationship in (i) above (2 mks)
- (c) (i) What is the feeding relationship between P and N if they belong to the same food chain. (2 mks)
 (ii) Account for the changes in population of species P during the months of July and October (4 mks)
- (d) If in the same year animal species N immigrated into the same habitat how would this affect the population of:-
 (i) N
 (ii) P
7. (a) (i) What is meristem (1 mk)
 (ii) Give three characteristics of cell found in the region of cell division of special meristem. (3 mks)
- (b) Describe secondary thickening in flowering plants. (16 mks)
8. Describe the adaptations of the mammalian eye to its function. (20 mks)

SUNSHINE SECONDARY SCHOOL
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BIOLOGY 231/3
PAPER 3

1. The photographs below show three bean seedlings that are of the same age but grown under different environmental conditions. Examine them.



- (a) Based on external appearance of the seedlings, suggest the conditions under which each of them was grown. Q, R, S (3 mks)
 (b) List three observable differences between seedlings R and S. (3 mks)
 (c) State the term used to describe the phenomenon exhibited by specimen S hence give the significance of the phenomenon. (2 mks)

Term

Significance

- (d) Name the response exhibited by seedling Q and explain how it occurs. (3 mks)
 Name
 Explanation

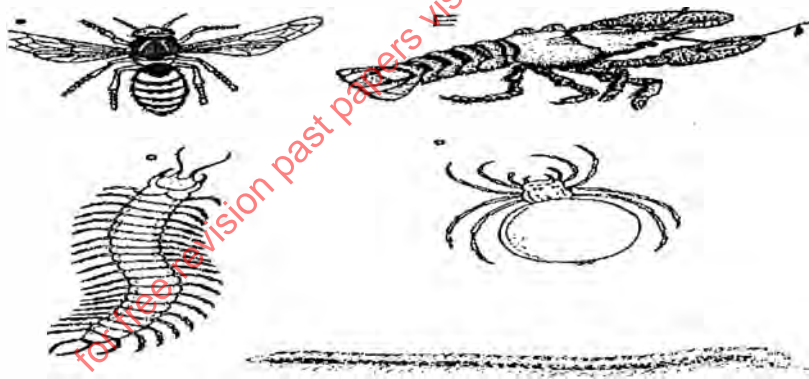
- (e) State the type of germination that occurs in the three seedlings and give a reason. (2 mks)
 Name
 Reason

2. You are provided with solutions X, dilute hydrochloric acid; solution Y, Benedict's solution; D.C.P.I.P solution W, Sodium hydrogen carbonate solution.

Using the reagents provided, investigate the food substances in the solution labeled T and complete the table below. (14 mks)

Food substance	Procedure	Observation	Conclusion

3. Examine the diagrams of the animals A, B, C, D and E.



- (a) Using observable features, identify the phylum to which the animals belong. (1 mk)
 Phylum
 Reasons (2 mks)
 Use the key given to answer the questions that follow.

1. (a) Animals with wings Insecta
 (b) Animals without wings go to 2
 2. (a) Animals with legs Arachnida
 (b) Animals with more than 8 legs go to 3
 3. (a) Animals with two body parts Crustacea
 (b) Animals with body metamerically segmented go to 4
 4. (a) Animals with one pair of legs on each body segment Chilopoda
 (b) Animals with 2 pairs of legs on each segment Diplopoda

Use the key complete the table below (10 mks)

Animal	Steps	Identity
A		
B		
C		
D		
E		

NAKA EVALUATION TEST.

Kenya Certificate of Secondary Education (K.C.S.E)

231/1

BIOLOGY

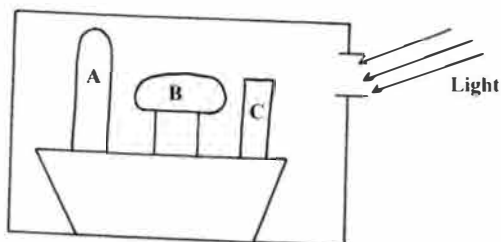
PAPER 1

THEORY

2017

TIME: 2 HOURS

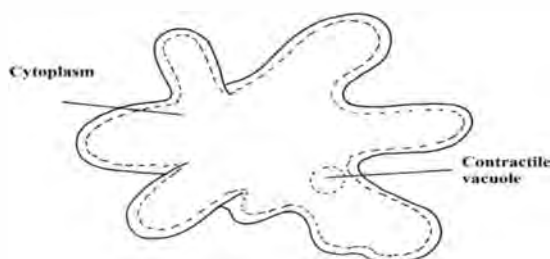
- 1 Name the element obtained from insects by insectivorous plants. (1mk)
- 2 An experiment was set up using seedlings as shown in the diagram below.



- a) What was the aim of the experiment? (1mk)
- b) Why were seedlings B and C included in the experiment? (1mk)
- 3 State the importance of the following processes that take place in human nephron.
 - a) Ultrafiltration (1mk)
 - b) Selective reabsorption (1mk)
- 4 State the functions of centrioles in a cell. (2mk)
- 5 State **ONE** process that takes place during the light stage and **ONE** that takes place in the dark stage of photosynthesis. (2mks)

Light stage;

Dark stage;
- 6 Give a reason why a diet consisting of maize meal and cabbage if eaten over a long period may lead to Kwashiorkor in children. (2mks)
- 7
 - a) What is meant by non-disjunction? (1mk)
 - b) Give **ONE** example of continuous variations in humans. (1mk)
- 8 State the functions of the following parts of mammalian ear.
 - a) Ear Ossicles. (1mk)
 - b) Semi-circular canals. (1mk)
 - c) Eustachian tube. (1mk)
- 9 Give a reason why primary productivity in an aquatic Ecosystem decreases with depth. (1mk)
- 10 State **TWO** functions of the substance secreted by sebaceous glands. (2mks)
- 11
 - a) What is homeostasis? (1mk)
 - b) Name **3** processes in the human body in which homeostasis is involved. (3mks)
- 12 Name the regions in plants where the following take place. (2mks)
 - i) Primary growth
 - ii) Secondary growth.
- 13 State **THREE** reasons for classifying organisms. (3mks)
- 14 A student observing a drop of water under the high power objective lens of a microscope observed an organism and drew the following organism.



- a) Suggest the kingdom to which the organism belongs. (1mk)
- b) Identify the organism. (1mk)
- c) Give an example of a disease caused by the organism. (1mk)
- 15 In an experiment, the pituitary gland of a rat was removed.
 - a) State the effect this will have on the quantity of urine produced by the rat. (1mk)
 - b) Give a reason for your answer in (a) above. (1mk)

- 16 State the functions of the following parts of a light microscope. (2mks)
 a) Objective lens
 b) Diaphragm
- 17 State **THREE** structural differences between arteries and veins in mammals (3mks)
- 18 State **TWO** ways in which plants compensate for their inability to move from one place to another. (2mks)
- 19 Distinguish between parthenogenesis and parthenocarp. (2mks)
- 20 In view of **modern** evolution, explain why Lamarkian theory is unacceptable (2mks)
- 21 What is the functional difference between a tendon and a ligament? (1mk)
- 22 Name **TWO** components of blood that are not present in the glomerular filtrate (2mks)
- 23 a) A person was not able to see far objects clearly but could view near objects clearly. Name the eye defect the person was suffering from. (1mk)
 b) How can the defect be corrected? (1mks)
- 24 a) Name **TWO** sites where gaseous exchange takes place in terrestrial plants. (2mks)
 b) State the importance of the following features in gaseous exchange.
 i) Cartilage in the trachea. (1mk)
 ii) Moisture on the surface of the alveoli. (1mk)
- 25 Explain how the following adaptations minimize the rate of transpiration.
 a) Sunken stomata (1mk)
 b) Leaf drooping (1mk)
- 26 State the role of decomposers in an ecosystem. (1mk)
- 27 State **THREE** advantages of asexual reproduction in organisms. (3mks)
- 28 Define the following terms as used in Ecology. (4mks)
 i) Biosphere.
 ii) Population.
 iii) Standing crop.
 iv) Carrying capacity.
- 29 a) Distinguish between Homologous and Analogous structures. (2mks)
 b) Give an example in each case the structures in (a) above. (2mks)
 Homologous structure.
 Analogous structure.
- 30 Explain why digestion of starch stops shortly after food enters the stomach. (1mk)
- 31 Explain why one fails to see clearly on moving from a brightly lit room to a poorly lit room. (2mks)
- 32 What is the significance of meiosis. (2mks)
- 33 Explain how the Erythrocytes are adapted to perform their functions. (3mks)
- 34 State **ONE** function of each of the following parts of the brain. (2mks)
 i) Hypothalamus.
 ii) Cerebrum.

NAKA EVALUATION TEST.

Kenya Certificate of Secondary Education (K.C.S.E)

231/2

BIOLOGY

PAPER 2

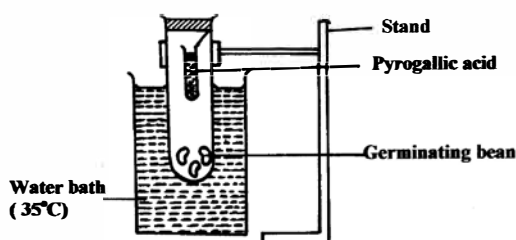
THEORY

2017

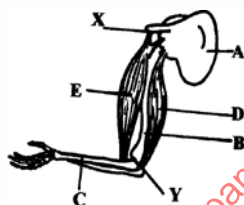
TIME: 2 HOURS

SECTION A (40MARKS)Answer all questions in this section in the spaces provided.

- 1 The diagram below shows a set up to investigate a factor necessary for germination.



- Name the factor under investigation. (1mk)
 - State the role of pyrogallic acid in the set up. (1mk)
 - Which type of respiration is taking place in the beans? (1mk)
 - Write a word equation for the process named in (c) above. (1mk)
 - Explain why plants can only carry out the above respiration process for a short while. (1mk)
 - State other **three** factors necessary for germination. (3mks)
- 2 The diagram below shows the arrangement of bones and muscles in a human arm.



- Name the parts labeled **A**, **B** and **C**. (3mks)
 - Explain how parts **D** and **E** bring about flexing and extending of the arm. (2mks)
 - Name the types of joints found at points **X** and **Y**. (2mks)
 - Name a fluid found in all the movable joints. (1mk)
- 3
- Name the blood vessel that connects arteries to veins. (1mk)
 - Explain **three** ways in which the vessels named in (a) (i) above are adapted to carry their functions. (3mks)
 - Name the blood vessel with the highest concentration of:
 - Glucose (1mk)
 - Carbon (IV) Oxide. (1mk)
 - Sate the function of cardiac muscles. (1mk)
 - What is a single circulation? (1mk)
- 4 In a family of four children, the father had blood group A while the mother had blood group B. One of the children had blood group O. The father wanted to commit suicide accusing his wife of infidelity?
- Was this accusation justified? (1mk)
 - With the use of a punnet square work out the genotype of other children. (4mks)
 - The child of blood group O can donate blood, to all other children but can receive blood from none. Explain. (2mks)
 - One of the other children was able to receive blood from all the other children but donate to none. What was the blood group of such a child? (1mk)
- 5
- Distinguish between Osmosis and Active transport. (2mks)
 - Study the figure below and answer the questions that follow.
 - Which solution has higher concentration of free water molecules. (1mk)
 - Which solution is more concentrated? (1mk)
 - In which direction will Osmosis take place? (1mk)
 - What does semi-permeable membrane represents in an animal cell. (1mk)
 - Name **two** processes in living organisms that depend on Osmosis. (1mk)

SECTION B (40MARKS)

- 6 A group of students estimated the population of the grasshoppers in the school compound. The table below shows the number of grasshoppers collected from the eight sites within the compound.

Site	1	2	3	4	5	6	7	8
No. of grasshoppers	250	50	190	220	85	300	175	30

- a) Draw histograms to represent the number of grasshoppers collected from each site. (6mks)
- b) The students caught 240 grasshoppers marked them and then released them. After five days they caught 160 grasshoppers and found that 40 were marked. Work out the grasshoppers population. (3mks)
- c) Identify the method used in (b) above. (1mk)
- d) Name the instrument the students used to collect and mark the grasshoppers. (2mks)
- e) The students encountered a number of limitations. State any three of the limitations. (3mks)
- f) The students observed the organisms and placed them into their correct phylum and class. (2mks)
- i) Name; Phylum.....
Class.....
- ii) What features were observed for the grasshoppers to be placed in their correct; (3mks)
Phylum.....
Class.....
- 7 Describe how the human skin is adapted to its function. (20mks)
- 8 a) State **three** aspects of light that are important in photosynthesis. (3mks)
- b) Describe how the leaves of plants are adapted to carry out photosynthesis. (17mks)

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NAKA JOINT EVALUATION TEST.
Kenya Certificate of Secondary Education

231/3
BIOLOGY
PAPER 3
PRACTICAL

PRACTICAL REQUIREMENTS

(CONFIDENTIAL)

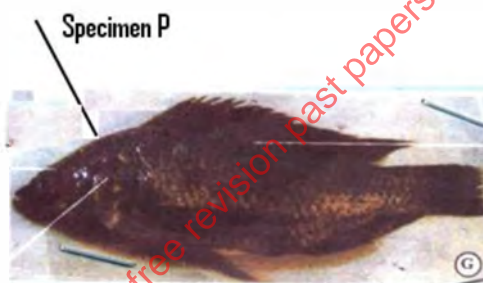
- ❖ A piece of sugarcane with a leaf, bud and 3 internodes labeled Y
- ❖ Mortar and pestle
- ❖ Iodine solution labeled solution P
- ❖ Benedicts solution labeled solution Q
- ❖ 1% CuSO₄ labeled solution R
- ❖ Means of heating
- ❖ Three test tubes with a rack
- ❖ 5% NaOH labeled S
- ❖ Knife/scalpel
- ❖ Small beaker
- ❖ Muslin cloth/piece of cloth
- ❖ Distilled water

NAKA EVALUATION TEST.
Kenya Certificate of Secondary Education (K.C.S.E)

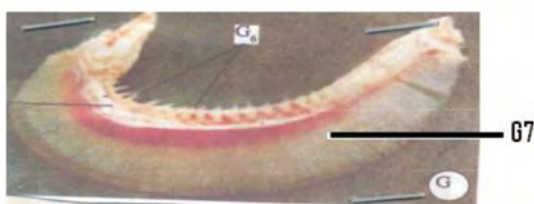
231/3
BIOLOGY
PAPER 3
PRACTICALS
2017

TIME: 1 ¼ HOURS

- 1 You are provided with photograph of specimen P.

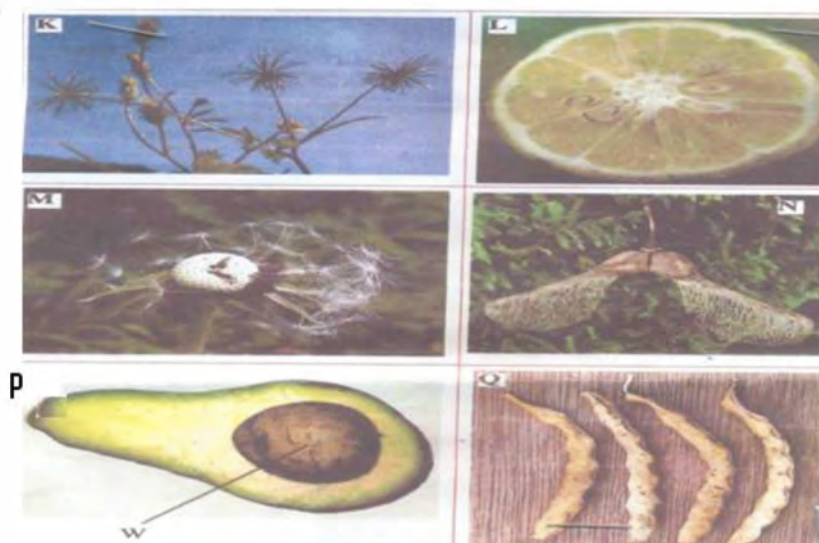


- a) i) Name the class to which the specimen P belongs. (1mk)
 ii) Give two reasons for your answer in a(i) above. (2mks)
- b) Name observable features that adapt the specimen to.
- i) Forward movement (1mk)
 ii) Balancing (1mk)
 iii) Staying upright (1mk)
 iv) Fast movement (1mk)
- c) The part below was cut and removed from specimen P.



- i) Identify the specimen extract (1mk)
 ii) Name parts labeled G₆ and G₇ (2mks)
 iii) State the function of the specimen extract (1mk)

2 Below are photographs of specimens obtained from plants. Examine the photographs.



a) In the table below name the mode of dispersal and the features that adapt each specimen to that mode of dispersal. (12mks)

Specimen	Mode of Dispersal	Adaptive Feature
K		
L		
M		
N		
P		
Q		

b) State the type of placentation in specimen L. (1mk)

c) Name the structure labeled W on specimen P. (1mk)

d) State the type of fruit represented by specimen L. (1mk)

3 You are provided with specimen Y which is part of a plant.

a) With reason identify the part of the plant represented by specimen Y. (2mks)

b) Draw a plain diagram of the transverse section of one of the cut surfaces. (1mk)

c) With reason state the class of the plant from which specimen Y was obtained. (2mks)

d) Peel the specimen using a knife. Put the small pieces of the peeled parts in a mortar. Use the pestle to crush the pieces. Squeeze out juice from the crushed pieces into a small beaker. Use the reagent provided to determine the food substance present in specimen Y. Record the food substance tested. Procedure, observations and conclusions in the table below. (9mks)

Note:

- Solution P is Iodine Solution,
- Solution Q is Benedict Solution
- Solution R is 1% CuSO_4 ,
- Solution S is 5% NaOH,

Food Tested	Procedure	Observation	Conclusion

MOSTA JOINT EVALUATION EXAMINATION 2017**Kenya Certificate of Secondary Education**

231/1

BIOLOGY

(Theory)

2 hours

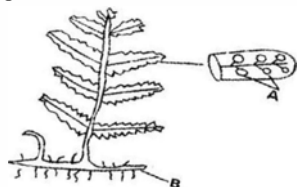
1. Name the tissues whose cells are thickened with:

- a) Cellulose and pectin.
b) Lignin.

(1mk)

(1mk)

2. The diagram below represents a fern.



- (a) Name Parts labeled A and B.

(2mk)

- (b) To which division does the plant belong?

(1mk)

3. State three measures that can be taken to control infection of man by protozoan parasites

(3mk)

4. Explain how the following factors hinder self pollination in plants:

- (i) Protogyny

(1mk)

- (ii) Dioecism

(1mk)

5. Explain the likely effect on humans and other organisms of untreated sewage discharged into water body that supplies water for domestic use.

(3mk)

6. Name two structures in herbaceous stems that enhance their support.

(2mk)

7. a) Define the term immunity.

(1mk)

- b) Distinguish between natural immunity and acquired immunity.

(1mk)

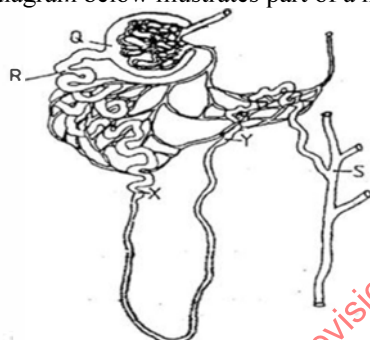
- c) Identify one immunizable disease in Kenya.

(1mk)

8. State three differences between osmosis and active transport.

(3mk)

9. The diagram below illustrates part of a nephron from a mammalian kidney.



- a) Name the fluid found in the part labeled Q.

(1mk)

- b) Identify the process responsible for the formation of the fluid named in (a) above.

(1mk)

- c) Which two hormones exert their effect in the nephron?

(2mk)

10. State three characteristics of members of kingdom Monera that are not found in other kingdoms.

(3mk)

11. What is meant by the following biological terms?

- i) Crenation

(1mk)

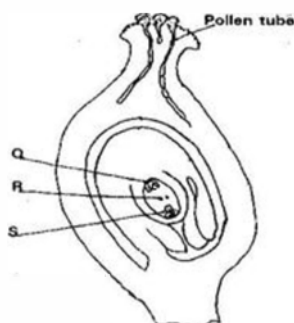
- ii) Haemolysis

(1mk)

- iii) Plasmolysis

(1mk)

12. The diagram below shows a stage during fertilization in flowering plant.



- a) Name the parts labeled Q, R, and S.

(3 mk)

- b) State the function of the pollen tube.

(1 mk)

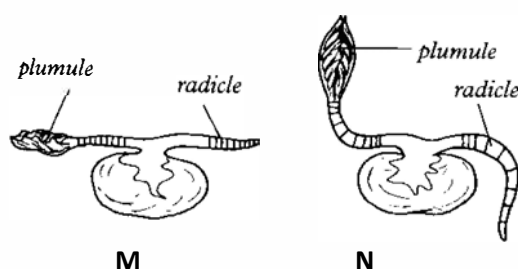
13. a) State the major factor in the 'Global warming' experienced in the world today.

(1mk)

b) Suggest two ways of reducing the Global warming.

(2mk)

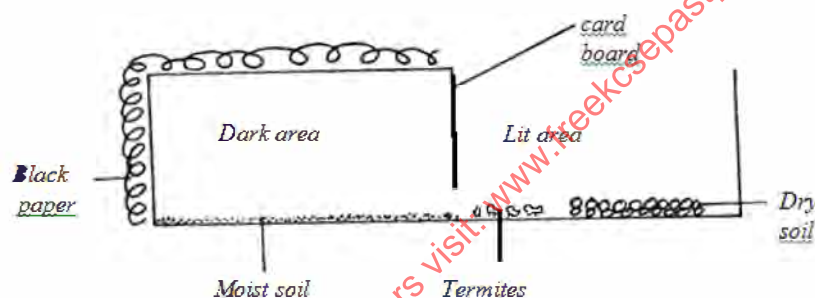
14. An experiment was set to investigate a certain aspect of response. A seedling was put on a horizontal position as shown in figure M below. After 24 hours, the set up was as shown in figure N.



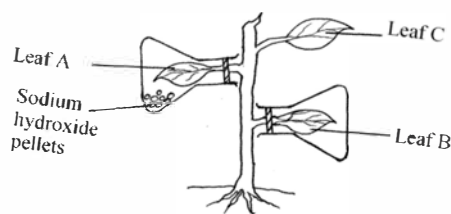
M

N

- a) Name the response exhibited. (1mk)
- b) Explain the curvature of the shoot upwards. (3mk)
15. The paddles of whales and the fins of fish adapt these organisms to aquatic habitats.
- a) Name the evolutionary process that may have given rise to these structures. (1mk)
- b) What is the name given to such structures? (1mk)
- c) Give two examples of vestigial organs in man. (2mk)
16. a) Name a protein and vitamin involved in blood clotting.
- i) Protein. (1mk)
- ii) Vitamin (1mk)
- b) Explain why blood is not normally used for transfusion after one month. (1mk)
17. A group of Form four students set up an experiment to investigate a biological process using termites. They used a small box in which a portion was covered with black paper and had moist soil. The open part had dry soil. Termites were placed inside in open area of the box.



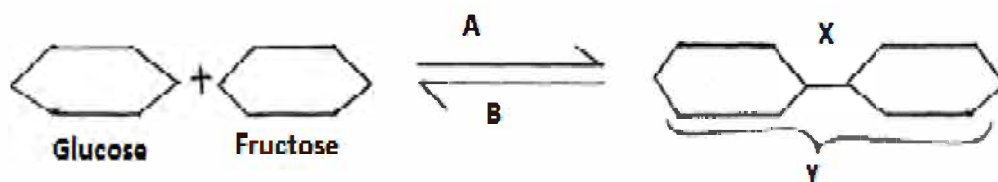
- a) Predict what happened to the termites after 30 minutes. (1mk)
- b) What form of response is exhibited by termites? (1mk)
- c) State one biological significance of the above response to termites. (1mk)
18. a) Name two fins in a bony fish which perform the following functions:-
- i) Changing direction. (1mk)
- ii) Control pitching. (1mk)
- (b) State the role of myotomes in fish. (1mk)
19. The diagram below represents an experimental set up to investigate a certain scientific concept. The potted plant was first destarched by keeping it in dark for four days.



The set up was then placed in sunlight for five hours and leaves were tested for starch.

- a) What scientific concept was being investigated? (1mk)
- b) i) Give the results likely to be obtained after starch test for A and B. (2 marks)
- ii) Account for the results in leaf A in b (i) above. (1mk)
- c) Why was leaf C included in the set-up? (1mk)
20. a) Explain the importance of transport in plants. (2mk)
- b) What is the role of root hairs in plants? (1mk)
21. a) Identify the source of urea that is removed via the kidneys in a healthy human being. (1mk)
- b) Explain why a pregnant woman excretes less urea compared to a woman who is non- pregnant. (2mk)

22. Study the reaction below and answer the questions that follow.



- a) What biological processes are represented by A and B? (2mk)
 - b) Identify the product Y. (1mk)
 - c) State the bond represented by X. (1mk)
23. Explain the events of the light stage of photosynthesis. (3mk)
24. Explain what happens in humans when the concentration of glucose in the blood rises above the normal level. (3mk)
25. a) Outline the main features of Lamarckian theory of evolution. (2mk)
- b) In view of modern genetics, explain why Lamarck's theory is unacceptable. (1mk)
- c) Name one factor in nature that increases the process of evolution. (1mk)

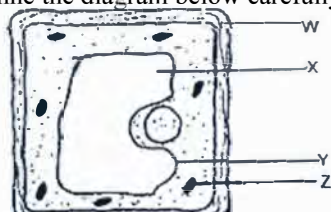
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MOSTA JOINT EVALUATION EXAMINATION 2017
KENYA CERTIFICATE OF SECONDARY EDUCATION
 231/2
BIOLOGY
PAPER 2
THEORY
TIME: 2 HOURS

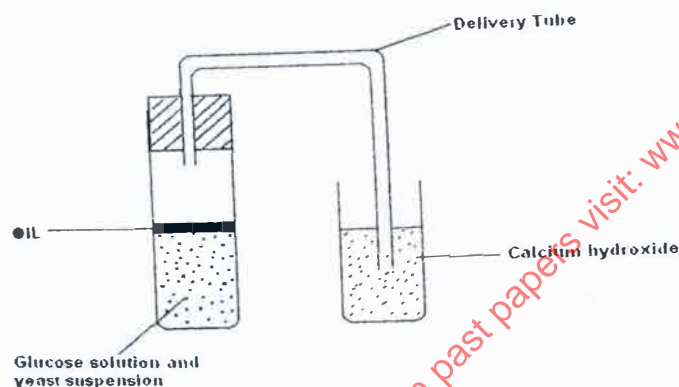
SECTION A (40 MARKS)

Answer all the questions in this section.

1. Examine the diagram below carefully and use it to answer the questions that follow.



- (a) Name the parts X, Y and Z. (3 marks)
- (b) State the main substance which make-up the part labeled W. (1 mark)
- (c) Name the process through which mineral salts move into the structure labeled X. (1 mark)
- (d) Explain what happens to a red blood cell when placed in distilled water. (3 marks)
2. (a) What is meant by natural selection? (4 marks)
- (b) State four sources of evidences that support the theory of organic evolution. (4 marks)
3. The diagram below shows a set up that was used to demonstrate a certain physiological process.



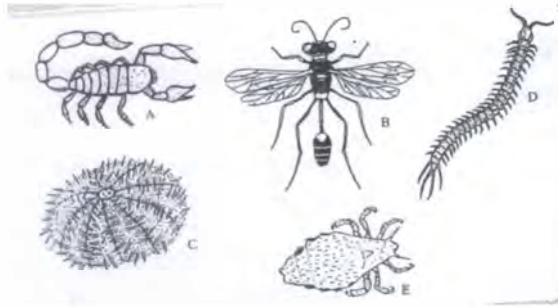
The glucose solution was boiled and oil added on top of it. The glucose solution was then allowed to cool before adding yeast suspension.

- (a) Identify the physiological process that was being investigated using the above set up. (1 mark)
- (b) Why was glucose boiled during the experiment? (1 mark)
- (c) What was the importance of cooling the glucose before adding the yeast suspension? (1 mark)
- (d) What observation would be made in test tube at the end of the experiment? (1 mark)
- (e) How would the observation made in (d) above be affected if oil was not added on top of the yeast suspension during the experiment? (1 mark)
- (f) In another investigation, a bird was found to use 10 litres of oxygen to give a respiratory quotient of 0.7 during period of flight. Name the type of food that was being respired by the bird and determine the amount of carbon (IV) oxide produced during the same flight.

Type of food :- (1 mark)

Volume of carbon (IV) oxide produced. (2 marks)
4. Pure breed of red cows and pure breed of white bulls were crossed to give F_1 calves which had a mixture of red and white coat known as roan. The F_1 were selfed.
 - (a) Using letter R to represent gene for red colour and W to represent gene for white colour work out the phenotypic ratio of F_2 . (4 marks)
 - (b) Work out the genotypic ratio of a cross between F_1 offspring and white bull. (3mks)
 - (c) Comment on the gene(s) controlling the colour of coats in cattle mentioned above. (1mk)

5. You are provided with photographs of animals. Study the photographs and the dichotomous key below to enable you identify the taxonomic group to which each animal belongs.

**KEY**

1. a) Jointed legs presentgo to 2
b) Jointed legs absent.....go to 7
2. a) Three pairs of legsgo to 3
b) More than 3 pairs of legs.....go to 5
3. a) Wings presentgo to 4
b) Wings absent.....Anoplura
4. a) One pair of wings.....Diptera
b) Two pairs of wings.....Hymenoptera
5. a) Four pairs of legsArachnida
b) More than ten pairs of legsgo to 6
6. a) One pair of legs in each body segment.....Chilopoda
b) Two pairs of legs in each body segmentDiplopoda
7. a) Body partially enclosed in a shell.....Mollusca
b) Body surface has spiny projection.....Echinodermata

- a) Using the key, identify the following organisms to their taxonomic groups. In each case, give the sequence of steps which you followed in identifying them. (4 marks)

Animal	Identity	Steps followed
A		
B		
D		
E		

- b) i) Using observable features only, state the class to which the animal labeled A and B on the photographs above belong (2 marks)
State two observable features on B, that enabled you to arrive at that answer in (b (i) above. (2 marks)

SECTION B (40 MARKS)

Answer question six (6) in the spaces provided (compulsory). Choose either question 7 or 8 and answer in the space provided after question 8.

6. During an ecological study of a lake, a group of students recorded the following observations.
- i) Planktonic crustaceans feed on planktonic algae;
 - ii) Small fish feed on planktonic crustaceans, worms and insect larvae;
 - iii) Worms feed on insect larvae;
 - iv) A bird species feeds on small fish, planktonic crustaceans, worms and large fish;
 - v) Insect larvae feed on planktonic algae;
 - vi) Large fish feed on small fish.
- a) From this record of observations, construct a food web. (4 marks)
- b) From the food web, isolate and write down a food chain that ends with:-
- i) Bird species as a secondary consumer. (1 mark)
 - ii) Large fish as a tertiary consumer. (1 mark)
- (c) The biomass of the producers in the lake was found to be greater than that of primary consumers. Explain this observation. (2 marks)
- (d) Using the food web, identify three pairs of organisms that compete for food in the lake and for each case, name the food being competed for. (6 marks)
- (e) (i) State three ways by which human beings may interfere with this lake ecosystem. (3 marks)
(i) Explain how each of the ways stated in (e) (i) above may affect life in the lake. (3 marks)
7. a) Describe the digestion of a starchy meal along the human alimentary canal. (13 marks)
b) Describe the process of urea formation. (7 marks)
8. a) Describe how gaseous exchange occurs in terrestrial plants. (13 marks)
b) Describe the process of metamorphosis in a grasshopper. (7 marks)

MOSTA JOINT EVALUATION EXAMINATION 2017
K.C.S.E (Kenya Certificate of Secondary Education)

231/3
BIOLOGY
PAPER 3
PRACTICAL
2017
TIME: 1 ¼ HOURS

Confidential

Requirements

- Thread
- 250ml beaker
- Distilled water
- Glass rod
- Iodine solution
- Benedict's solution
- Means of heating
- 10% glucose solution
- 1% starch solution
- 10cm visking tubing
- 4 test tubes on a rack
- S – Datura
- R – Maize fruit
- L – Orange
- K – Bean pod
- M – Mango
- Hand lens
-

MOSTA JOINT EVALUATION EXAMINATION 2017
K.C.S.E (Kenya Certificate of Secondary Education)

231/3
BIOLOGY
PAPER 3
PRACTICAL
2017
TIME: 1 ¼ HOURS

1. You are provided with a visking tubing. Open one end and blow air through the open end. Tie firmly one end with a piece of thread provided. Make sure that it is not leaking.
 Put into the tubing equal quantities of solution L1 and L2. Tie with a thread the open end and ensure that the thread is long enough to suspend the visking tubing from the glass rod as shown in the diagram.

Put the tubing suspended in distilled water as shown above. Let the set up stand for 30 minutes.

As you wait, carry out the food tests on solution L1 and L2 separately. Use only the reagents provided and fill the table below. (6 marks)

a)

	Test	Procedure	Observation	Conclusion
L1				
L2				

- b) Remove some solution from the beaker after 20 minutes from the time you set the experiment and test for the two food compounds you tested in (a) above

Test	Observation	Conclusion

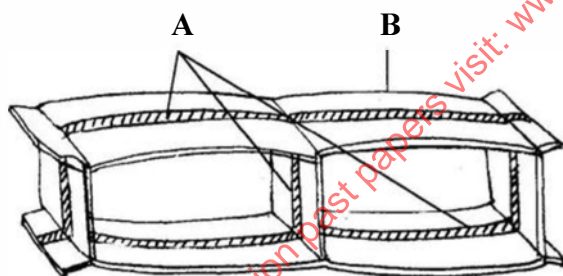
(2 marks)

- c) Add 3 drops of iodine solution into the beaker. After 6 – 10 minutes, what do you observe in;
- (i) The beaker (1 mark)
 - (ii) Visking tube (1 mark)
- d) What physiological process is being tested in step (b) and (c) above (1 mark)
- e) Account for your observations in steps (b) and (c) (3 marks)
2. Below is a photograph of an organism. Examine it and answer the questions that follow.
- a) The actual length of the pair of scissors next to the organism is 12.5cm. Using this information, calculate actual length of the organism. (4 marks)
- b) The photograph below shows structures visible after removing the parts labelled P. The inset is a magnified view of one of the structures.
- (i) Name the parts labelled R, S and T (3 marks)
 - (ii) Explain how each of the parts named in (i) above is adapted to its function (3 marks)
- c) The photograph below shows the inner surface of the upper left side of the rib cage. Explain the role of the part labelled M in inhalation (4 marks)
3. (i) Identify the fruits labelled S, L, K and M (5 marks)
- (ii) Give a reason for your identify of the specimen; S R M (3 marks)
 - (iii) Briefly describe any two types of placentations found in the fruits provided in 3(i) above (2 marks)
 - (iv) State one difference between a seed and a fruit (1 mark)
 - (v) Using the handlens provided draw the fruit labelled R (3 marks)

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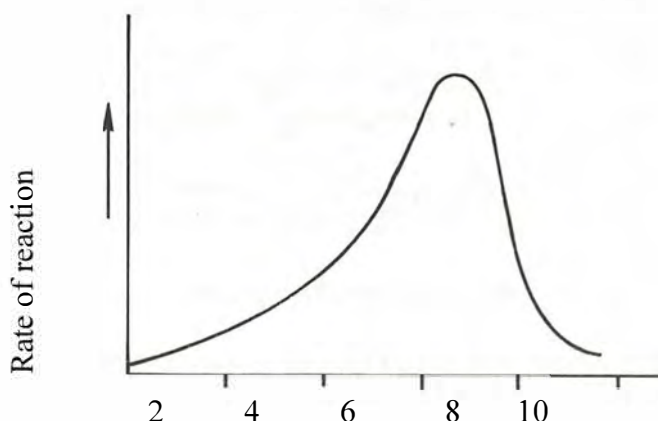
COMPLIANT PREPARATORY EXAMINATION
231/1 (THEORY)
BIOLOGY PAPER 1
TIME: 2 HOURS

1. Give the differences between a bean plant and a bat in respect to nutrition, growth and movement. (2 marks)
2. Give **two** reasons why a cell must undergo interphase before mitosis starts. (2 marks)
3. (a) Differentiate between a biome and a habitat. (2 marks)
- (b) State the biggest ecosystem on earth. (1 mark)
4. State **three** limitations of quadrat method used in estimation of population of organisms in a given ecosystem. (3 marks)
5. State **two** importance of aerobic respiration. (2 marks)
6. Name the genetic defects due to extra chromosome number 21 and 13. (2 marks)
7. Name the **two** products of dark reaction of photosynthesis in plants. (2 marks)
8. Name **two** sites of respiration in a cell. (2 marks)
- (a) Differentiate between sickle-cell anaemia and sickle-cell trait. (2 marks)
- (b) Name the type of gene mutation that brings about the sickle cell anaemia. (1 mark)
9. Give **one** example in each case of the following:
 - (a) a fixed joint: (1 mark)
 - (b) a ball and socket joint: (1 mark)
10. Through which blood vessels does the blood from the alimentary canal return to the heart? (2 marks)
11. What are the functions of sepals in a flower? (2 marks)
12. (a) Name **two** examples of polysaccharides in plants. (2 marks)
- (b) What is the main element composition of carbohydrates? (1 mark)
13. List **two** isolation mechanisms which could lead to speciation. (2 marks)
14. Name **two** characteristic features used to distinguish a mammal from other vertebrates? (2 marks)
15. Name the nitrogenous wastes in the following category of fish.
 - (a) Marine fish. (1 mark)
 - (b) Fresh water fish. (1 mark)
16. (a) Give **the** function of fallopian tube of a mammal. (1 mark)
- (b) What is the name given to the pregnancy that occurs in the fallopian tube? (1 mark)
17. The diagram below represents cells of a structure found in the root of a plant.



- (a) Identify the cells. (1 mark)
- (b) Name the parts labelled **A** and **B**. (2 marks)
18. (a) Which component of the diet is largely responsible for causing tooth decay? (1 mark)
- (b) Explain how the component you have named in (a) above causes the tooth decay. (2 marks)
19. What role does the eye lens play in accommodation of the eye when one looks at a near object? (1 mark)
20. List **the** ways in which the body might lose heat. (2 marks)
21. List the causative agent of the following sexually transmitted infections (STIs):
 - (a) Gonorrhoea. (1 mark)
 - (b) Syphilis (1 mark)
22. By what means can malarial parasites be transmitted from an infected person to a healthy? (1 mark)
23. (a) How would you destarch the leaves of a potted plant? (1 mark)
- (b) Which chemical would you use to test for presence of vitamin C in a food substance? (1 mark)
24. Name the **two** types of chemical compounds which combine to form a lipid. (2 marks)
25. Name the processes by which the following enter the root hair cell.
 - (a) Oxygen. (1 mark)
 - (b) Water. (1 mark)
26. Give **two** structural differences between mature white blood cells and red blood cells. (2 marks)
27. Give **two** examples of genetic engineering that are intended to improve crop plants. (2 marks)

28. The graph shows the rate of an enzyme reaction at different levels of pH.



On the graph, mark the optimum pH for this enzyme?

(1 mark)

29. Name **two** structural proteins in mammals.

(2 marks)

30. An animal has 36 chromosomes in each of its body cells. How many of these chromosomes came from its male parent?

(1 mark)

31. Name **two** examples of endemic animals on earth.

(2 marks)

32. Give **two** characteristics of Cardiac muscles.

(2 marks)

33. Study the diagram below:



(a) From which type of plant is the section representing?

(1 mark)

(b) Give **two** reasons for your answer in (a) above.

(2 marks)

35. (a) Name the organelle involved in formation of cilia and flagella.

(1 mark)

(b) Give **two** strengthening material of cell wall of plant.

(2 marks)

36. State **two** homeostatic functions of mammalian kidney.

(2 marks)

37. What type of gene mutations are represented by the following messages?

(2 marks)

i) Intended message: Lions have pointed claws.

Actual message: Lions have pointed laws.

ii) Intended message: The strong wind caused severe damage.

Actual message: The strong wind paused severe damage.

38. Name **two** effects of polythene bags in the environment.

(2 marks)

COMPLIANT PREPARATORY EXAMINATION

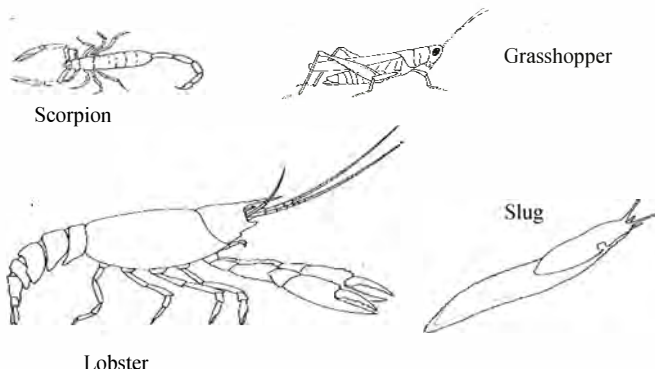
231/2 (THEORY)

TIME: 2 HOURS

231/2 (THEORY)

BIOLOGY PAPER 2

1. (a) Complete the dichotomous key below which can be used to identify the animals illustrated below. (3 marks)



3 pairs of walking legs Go to ___
 More than 3 pairs of walking legs Go to ___
 Body divided into segments Go to ___
 Body not divided into segments
 Antennae present
 No antennae

- (b) State the function of each of the following apparatus. (2 marks)

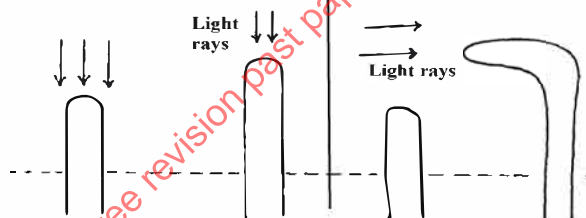
(i) Sweep net

(ii) Pooter

(c) What is a species? (1 mark)

(d) State **two** rules that must be followed when naming living organisms; (2 marks)

2. (a) An experiment was carried out to investigate a growth response in maize seedling as shown in the diagram below:



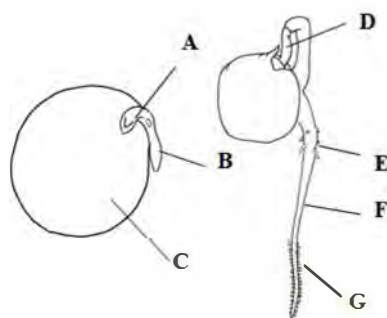
(i) State the type of response that is being investigated. (1 mark)

(ii) Explain the response exhibited by the shoot. (3 marks)

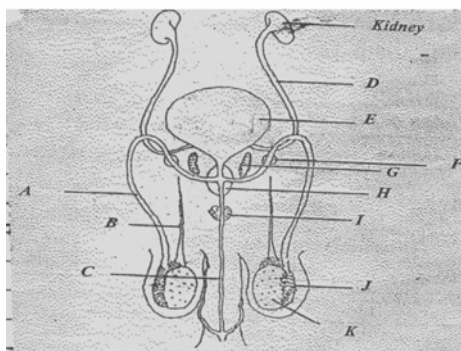
(b) (i) State **two** functions of a mammalian ear. (2 marks)

(ii) How is the cochlea suited to its function? (2 marks)

3. The figure 1 below represents a pea seed split open to show its structure. Figure 2 represents the same seedling 5 days after germination.



- (a) Name the **A**, **C** and **G**. (3 marks)
- (b) State the functions of parts **D** and **H**. (2 marks)
- (c) Give **two** differences between **B** and **F**. (2 marks)
- (d) The early stages of germination take place in the soil where there is little or no light for photosynthesis. How does the seedling obtain materials for its growth and energy needs during this time? (1 mark)
4. (a) What is gene linkage? (1 mark)
- (b) Haemoglobin is a sex linked trait.
- (i) If a normal woman but carrier for haemophilia marries a normal man, work out the phenotypes of the offspring using a genetic cross. (4marks)
- (ii) Why is haemophilia more common defect in males than in females? (1 mark)
- (c) Other than haemophilia state any other sex linked defect in man. (1 mark)
5. Shown below is a drawing of the human male reproductive system. Study the drawing and answer the questions that follow;



- (a) Name each of the parts **B**, **E** and **J**. (3marks)
- (b) Identify and name each of the parts described below;
- (i) Produce testosterone and other androgens, the male sex hormones. (1mark)
- (ii) Secrete prostaglandins which, once in the female reproductive tract, stimulate contractions of vaginal wall to expel any residual urine in the vagina. (1mark)
- (c) List **three** secondary human male sexual characteristics (3marks)

Section B (40 marks)

Answer question 6 and either question 7 or 8

6. Two experiments were carried out to investigate a certain physiological process in nature by determining the amount of carbon (IV) oxide used by maize plants at different temperatures under high light intensity and low light intensity. The data obtained was as below:

Temperature	Carbon (IV) oxide used per hour (mg)	
	High light intensity	Low light intensity
00	5.0	2.5
05	5.0	3.0
10	10.0	4.0
15	22.0	4.5
20	35.0	5.5
25	60.0	7.0
30	85.0	7.5
35	80.0	7.0
40	20.0	0.0

- (a) Draw a graphical representation of the data above in the grid provided. (8 marks)
- (b) Explain the difference in carbon (IV) oxide consumption between the set ups in low and high light intensity. (2 marks)
- (c) Account for the effects of the following temperatures on the experiment under high light intensity:
- i) 0°C and 30°C (3 marks)
- ii) 30°C and 40°C (3 marks)
- (d) Apart from the amount of carbon (IV) oxide used, suggest two other parameters which may be used to measure the rate of the process being investigated. (2 marks)
- (e) State the importance of the process above in an ecosystem (2 marks)
7. (a) What is drug abuse? (2 marks)
- (b) Describe the socio-economic problems associated with drug abuse. (18 marks)
8. Describe the adaptations of the skin to its functions. (20 marks)

COMPLIANT PREPARATORY EXAMINATION

231/3

Biology Practical

1 ¾ hours

231/3

Biology Practical

1. You are provided with an extract labelled T. using the reagents provided, test for the various food substances. Fill the table below. (12 marks)

Food Tested	Procedure	Observation	Conclusion

2. The photographs below show fruits of different plants.



A



B



C



D



E



F



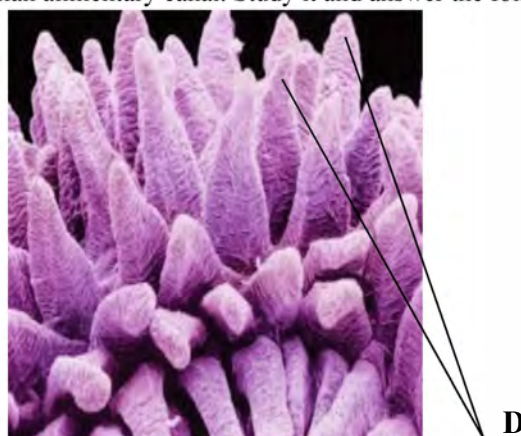
G

- (a) From the appearance of the structures, categorise the fruits according to their mode of dispersal. Give reasons for your answer in each category.
- (i) Dispersal by wind: (1 mark)
Reason: (1 mark)
- (ii) Dispersal by Animals: (1 mark)
Reasons: (2 marks)
- (iii) Dispersal by water: (1 mark)
Reason: (1 mark)
- (iv) Self dispersal: (1 mark)
Reason: (1 mark)
- (b) State the type of fruit represented by specimen A, C and G. (3 marks)
- (c) What are the advantages to a plant of an effective method of seed dispersal? (2 marks)
- (d) State **two** ways in which specimen F is adapted to its mode of dispersal. (2mks)

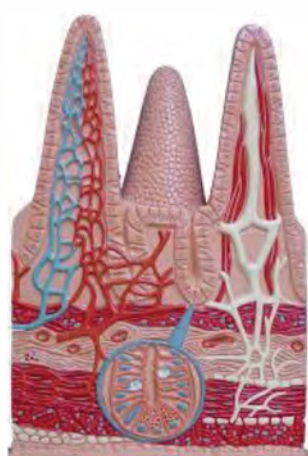
3. Below are photographs of a section of a mammalian alimentary canal. Study it and answer the following questions.



Photograph P



Photograph Q



**Diagram of parts
D showing blood**



**Photomicrograph of cells of
lining of parts D**

- (a) Identify the section represented in the two photographs. (1 mark)
- (b) Name the parts marked **D** and **E**. (2 marks)
- (c) (i) State the function of the parts labelled **D**. (1 mark)
- (ii) How is the part labelled **D** adapted to its function you have stated in (c)(i) above? (3 marks)
- (iii) Suggest **one** role of the cell from which the photomicrograph was taken, on the basis of the structure **E** highlighted on the photomicrograph. (1 mark)
- (d) Draw a well labelled diagram the part labelled **D** in the space provided. (4 marks)

**COMPLIANT PREPARATORY EXAMINATION
BIOLOGY
PRACTICAL
PAPER 231/3**

CONFIDENTIAL INSTRUCTIONS TO SCHOOLS

Each Candidate will require:

- 4 test tubes
- Test tube rack
- Test tube holder
- Extract of ripe avocado fruit in a boiling tube labelled T.
- Distilled water
- Filter paper
- 2 droppers

To have access to:

- Benedicts' solution
- Iodine solution
- 10% sodium hydroxide solution
- 1% copper sulphate solution
- White tile
- Means of heating
- Hot water bath

**COMPLIANT PREPARATORY EXAMINATION
JULY 2017
BIOLOGY
PAPER 1
MARKING SCHEME**

1.

bean plant	bat
Autotrophic	Heterotrophic;
Growth restricted to the tips and occurs throughout	Growth occurs in all parts of plant and stops after sometimes;
Shows restricted movement mostly tropism.	Shows locomotion;

2. To accumulate enough energy required for cell division; To duplicate all the plant structures; To allow replication of DNA;
3. (a) Biome is an ecosystem comprising of extensive areas within a continent with distinct prevailing conditions and organism, while habitat is a place where organism and the prevailing conditions;
(b) Ecosphere/ Biosphere;
4. Tedious; Cannot be used in inaccessible areas like thick forest; It cannot be used for fast moving animals; The landing of quadrat scares away some animals;
5. Energy production; Source of metabolic water;
6. Extra chromosome 21: Down's syndrome; Extra chromosome 13: Cleft lip;
7. Glucose/ simple carbohydrates; Water;
8. Cytoplasm; Mitochondria;
9. (a) Sickle-cell anaemia is a genetic disorder in which all individual's red blood cells have abnormal haemoglobin S that makes the cells to have crescent shape; sickle-cell trait is a genetic disorder in which the individual have a mixture of normal and abnormal red blood cells;
(c) Substitution mutations;
10. (a) Sutures of skull; Pubis symphysis joint;
(b) That between scapula and humerus at the shoulder; That between femur and innominate bone of pelvic girdle;
11. Hepatic vein; vena cava;
12. Protection of the delicate floral parts at budding stage against mechanical damage; carry out photosynthesis; In some flowers they are brightly coloured to attract pollinators;
13. (a) Starch; Cellulose;
(b) What is the main element composition of carbohydrates Carbon;
14. Behavioural; Geographical; Ecological; Genetical;
15. Body covered with fur; mammary glands; diaphragm; suckling its young ones;
16. (i) Trimethyl-amine oxide;
(ii) Ammonia;
17. (a) Site for fertilisation;
(c) Ectopic pregnancy;
18. (a) Endodermal cells;
(b) A: Casparian strip; B: Cell wall;
19. (a) Refined sugars;

- (c) Fermented by bacteria producing acid; which dissolves enamel forming cavities;
 20. Refracting of light rays; Refraction/ bending of light rays
 21. Radiation; Conduction;
 22. (a) *Neisseria gonorrhoeae*;
 (b) *Trepodema palladium*;
 23. Through transmission of plasmodium parasite by female Anopheles mosquito;
 24. (a) Placing the plant in darkness for 48 hours;
 (b) DCPIP
 25. Glycerol; Fatty acids;
 26. (i) Diffusion; (ii) Osmosis;
 27.

White blood cells	Red blood cells
Irregular in shape	Biconcave discs;
Lack haemoglobin	Have haemoglobin;
Have nuclei	Lack nuclei;

28. Coming up with resistant varieties to diseases and drought; producing high yielding crops; Breeding of seedless crops like bananas;
 29. pH 7;
 30. Keratin; Haemoglobin;
 31. 18;
 32. Kangaroo of Australia; Kiwi birds of New Zealand; Irama of Latin America; Tiger of Australia;
 33. Contract and relax non-stop without fatigue; Myogenic in nature;
 34. (a) Monocotyledonous plant;
 (b) Lack of vascular cambium; No pith; Scattered vascular bundles in ground tissue;
 35. (a) Centriole;
 (b) Pectin; Lignin;
 36. Osmoregulation; Regulation of blood pH;
 37. (i) Deletion;
 (ii) Substitution;
 38. Clogging drainage; Interference of aesthetic value; Bloating when eaten by animals;

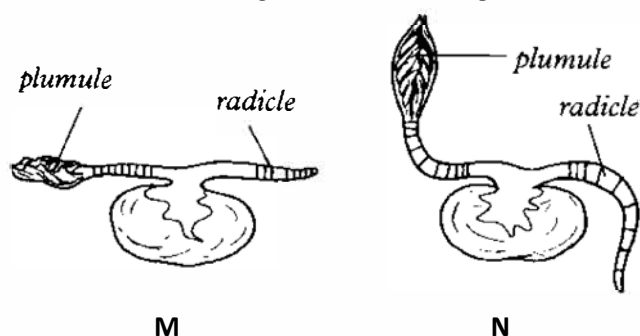
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MURANGA SOUTH A**231/1****BIOLOGY****PAPER 1****FORM 4****JULY 2017****TIME: 2 HOURS****Kenya Certificate of Secondary Education****INSTRUCTIONS****ATTEMPT ALL THE QUESTIONS**

1. Some form one students wanted to collect the following animals for study in the laboratory. State the suitable apparatus they should use.
 - i) Flying insects (1 mark)
 - ii) Crawling stinging insects (1 mark)
 - iii) Small animals from tree barks (1 mark)
2. The diagram below represents a mammalian vertebra.

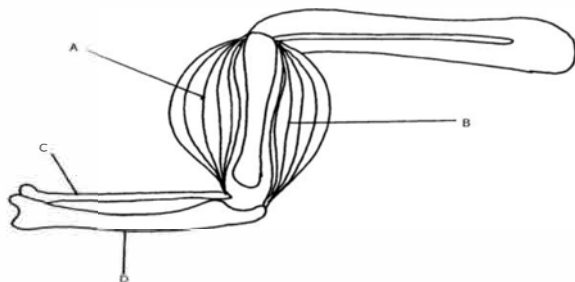


- (a) Identify the vertebra represented above. (1mk)
 - (b) Give a reason for your answer. (1mk)
- (a) Explain the role of oxygen in Active transport (1mk)
 - (b) Name two processes that depend on Active transport in animals (2mks)
- Explain how sunken stomata lower the rate of transpiration (2mks)
- State how xylem vessel is adapted to its function (3mks)
- a) Define the term immunity. (1mk)
 - b) Distinguish between natural immunity and acquired immunity. (1mk)
 - c) Identify one immunizable disease in Kenya. (1mk)
- State two adaptations of the alveolus to its functions. (2mks)
 - (a) Why may an asthmatic patient produce a wheezing sound during breathing? (1mk)
 - (b) What is the significance of the cartilage found in the human trachea being incomplete (c- shaped rings) (1mk)
- Define the following terms;
 - (i) Inter specific competition. (1mk)
 - (ii) Carrying capacity (1mk)
- Suggest two methods that can be used to determine that type of food eaten by animals. (2mks)
- (a) State one significance of genetics counseling (1mk)
 - (b) Part of a strand of DNA molecules was found to have the following sequence A-T-C-G-G-G-A-T-C-T. What is the sequence?
 - (i) Of the complementary strand? (1mk)
 - (ii) On a m- RNA strand copied (1mk)
- The paddles of whales and the fins of fish adapt these organisms to aquatic habitats.
 - a) Name the evolutionary process that may have given rise to these structures. (1mk)
 - b) What is the name given to such structures? (1mk)
 - c) Give two examples of vestigial organs in man. (2mk)
- An experiment was set to investigate a certain aspect of response. A seedling was put on a horizontal position as shown in figure M below. After 24 hours, the set up was as shown in figure N.

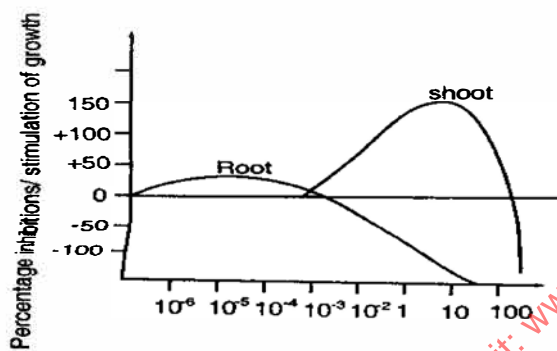


- a) Name the response exhibited. (1mk)
 b) Explain the curvature of the shoot upwards. (3mk)
13. The following is an equation representing a type of respiration
 $C_6H_{12}O_6 \rightarrow 2C_2H_5OH + 2CO_2 + \text{Energy}$
- a) Identify the type of respiration. (1mk)
 b) Suggest one industrial application of the process shown in the equation above (1mk)

14.

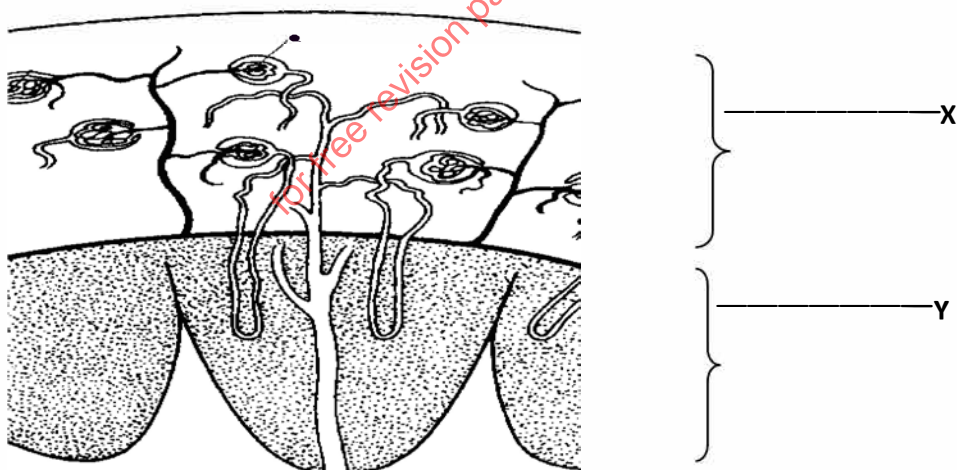


- a) Name the bones labeled C and D. (2 mark)
 b) What happens to structure A and B as the arm is straightened (1 mark)
15. Below is a graphical representation of the effects of different concentration of auxins on shoot and root growth. Study it carefully and then answer the questions that follow.



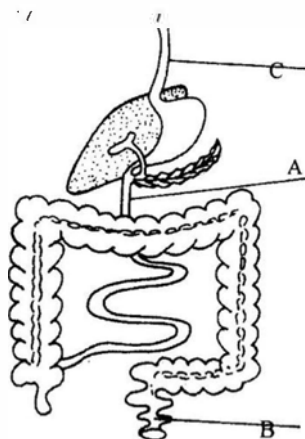
Auxin concentration (ppm)

- (a) Identify **any two** conclusions that can be drawn from the graph. (2mks)
 (b) Name the growth hormone responsible for ripening of fruits. (1mk)
16. The illustration below shows a transverse section through a mammalian kidney.



- (a) Name the structures labelled X and Y. (2 marks)
 (b) State the process in Q that leads to the formation of glomerular filtrate. (1mark)
17. State **three** differences in composition between umbilical artery and umbilical vein. (3 marks)
18. (a) What is meant by the term taxonomy? (1mk)
 (b) When are two organisms considered to belong to the same species. (2mks)

19). The diagram below shows part of alimentary canal of a mammal



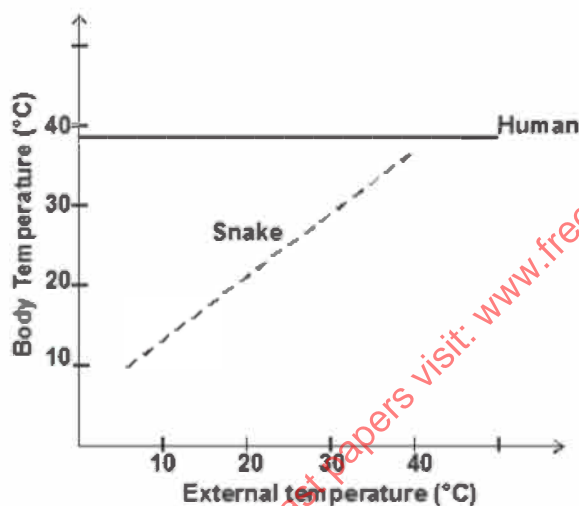
(i) Name the parts labeled A and C

(2mks)

(ii) State the function of the part labeled B

(1mk)

20). The graph below shows the relationship between body temperatures and external temperatures in a human being and a snake. Study it and answer questions that follow.



a) What happens to the temperature of each organism as the external temperature increases. (2 marks)

Human –

Snake –

b) Humans are described as homeothermic. State the advantage of this condition.

(2marks)

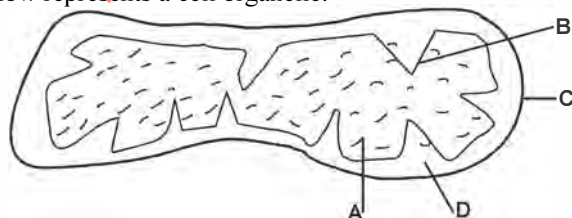
21. a) Name two products of light stage during photosynthesis.

(2 marks)

b) State three differences between light stage and dark stage of photosynthesis.

(3 marks)

22. The diagram below represents a cell organelle.



a) Identify the organelle.

(1 mark)

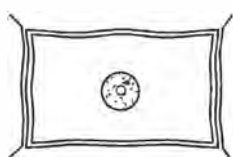
b) Name the part labelled B

(1 mark)

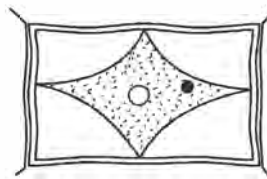
c) State the functions of the part labelled A

(1 mark)

23. The diagram below represents a plant cell that was subjected to a certain treatment.

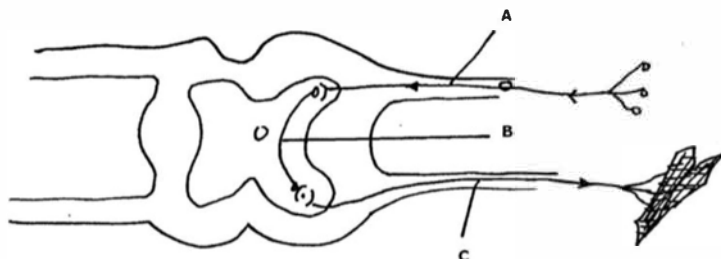


At the start



At the end of the experiment

- a) Account for the shape of the cell at the end of the experiment. (2 marks)
- b) Draw a diagram to illustrate how an animal cell would appear if subjected to the same treatment. (1 marks)
24. a) Give a reason why each of the following steps are followed when preparing cross sections of a leaf for examination under a microscope.
- Cutting thin sections. (1 mark)
 - Placing the sections in water. (1 mark)
25. a) Name two tissues in plants that provide mechanical support. (2 marks)
- b. Name the types of joints formed by each of the following pairs of bones:
- Axis and atlas. (1 mark)
 - Humerus with clavicle and scapula. (1mk)
- 26.) The diagram below represents a simple reflex ark



- (a) Name the parts labeled A, B and C
- (b) What is the role of part A

(3mks)
(1mk)

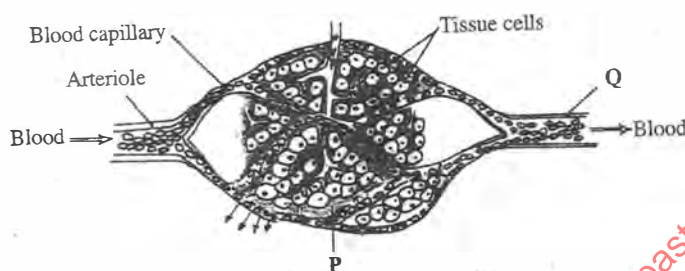
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MURANGA SOUTH A
231/2
BIOLOGY
PAPER 2
FORM 4
JULY 2017
TIME: 2 HOURS

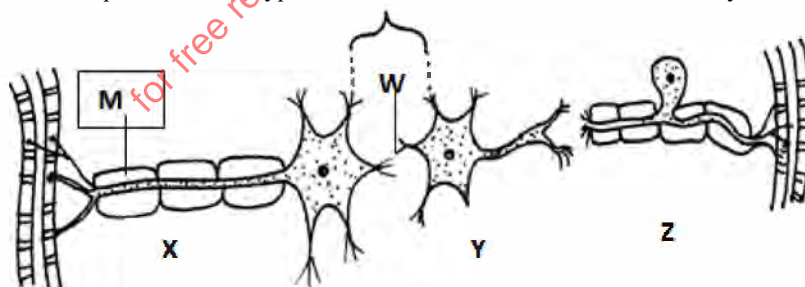
1. An experiment was carried out to investigate the rate of reaction shown below
 Sucrose \rightarrow Fructose + Glucose

For the products fructose and glucose to be formed, it was found that substance K was to be added and the temperature maintained at 37°C. When another substance L was added, the reaction slowed down and eventually stopped.

- (a) Suggest the identify of substances K and L (2 mks)
 (b) Other than temperature state three ways by which the rate of reaction could be increased (3 mks)
 (c) Explain how substance L slowed down the reaction (2 mks)
2. The diagram below shows blood circulation in a mammalian tissue.



- a) Name the part labeled **P** and **Q** (2 marks)
 b) Name the substance that are:
 i) Required for respiration that move out of capillaries; (2 marks)
 ii) Remove from tissue cells as a result of respiration (2 marks)
 c) Explain how substances move from blood capillaries into the tissue cells. (2 marks)
 d) Name **one** component of the blood that is not found in the part labeled **P** (1 mark)
3. The genetic disorder hemophilia is due to a recessive sex linked gene. A man who is hemophiliac marries a woman who is carrier for the condition.
- a) Using letter H to represent the normal condition and letter h for the hemophiliac condition.
 i) What is the genotype for the man and the woman? (2marks)
 ii) Work out a cross between the man and woman (3marks)
 b) What is the chance that both the first and second sons will be hemophiliac? (2marks)
 c) Hemophiliac is more common in males than in female human. Explain (1mark)
4. The diagram below represents three types of neurons found in a mammalian body.

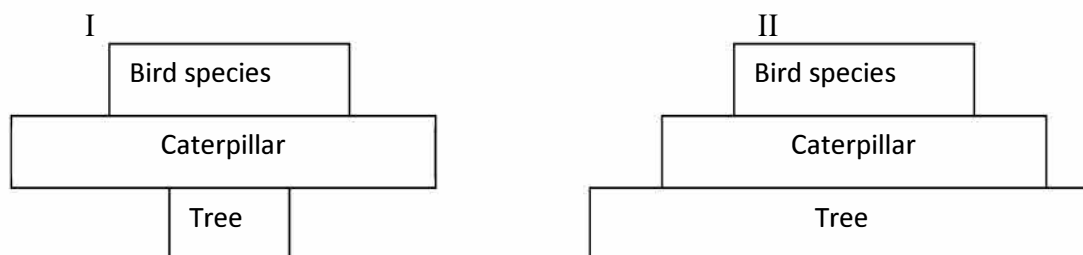


- (a) Name the neurons **X**, **Y** and **Z** (3marks)
 (b) Name the chemical substance responsible for the transmission of an impulse across the gap labelled **W**. (1mark)
 (c) State **two** functions of the part labelled **M**. (2marks)
 (d) In which part of the spinal cord is neurone **Y** located? (1mark)
 (e) Using arrows indicate on the diagrams the direction followed by nerve impulse leading to a response. (1mark)
5. The table below shows the number of Leopards and Impala in a grassland park over a period of six years.

Time in years	1	2	3	4	5	6
Number of Impala	360	498	546	216	120	72
Number of Leopard	11	17	25	7	3	2

- (a) (i) What is the average number of Impala in the park during the six years. (2 marks)

- (ii) Account for the decrease in the number of leopards between the 4th and 6th year? (3 marks)
- (b) Identify the trophic level occupied by
- (i) Leopards (1 mark)
- (ii) Tick feeding on the leopard. (1 mark)
- (c) The **two** pyramids shown were obtained in the park.



- (i) Identify each type of pyramid. (2 marks)

SECTION B: (40 MARKS)

Answer question 6 and any other one question

6. The percentage germination of certain seeds at different temperatures was determined as follows.

Temperature (°C)	0	10	20	30	40	50
% Germination	0	30	40	50	20	0

- a) Using a suitable scale, plot a graph of % germination against temperature. (5 Marks)
- b) Account for % germination at
- i) 0°C (2 Marks)
- ii) 30°C (2 Marks)
- iii) 50°C (2 Marks)
- c) What is seed viability? (1 Mark)
- d) Explain the role of the following during germination
- i) Hormones (2 Marks)
- ii) Enzymes (2 Marks)
- e) State **two** differences between epigeal and hypogeal germination. (2 Marks)
- f) State why secondary growth does not take place in maize plants. (1 Mark)
- g) State **one** difference between a seed and a fruit. (1 Mark)
7. Describe the function of the various parts of the mammalian skin. (20marks)
8. a) Describe the process of fertilization in flowering plant. (15marks)
- b) State the changes that take place in a flower after fertilization. (5marks)

MURANGA SOUTH A**231/3****BIOLOGY****PAPER 3****FORM 4****JULY 2017****TIME: $2\frac{1}{4}$ HOURS****Kenya Certificate of Secondary Education****CONFIDENTIAL**

- 8cm long visking tubing
- 50ml of distilled water (labelled solution X) in a 100ml beaker.
- 80ml of 10% Glucose solution (labelled solution Y) in a 100ml beaker.
- 2 pieces of thread, 30cm each.
- Benedict's solution.
- Means of heating
- Two test tubes.
- Two droppers.

MURANGA SOUTH A**231/3****BIOLOGY****PAPER 3****FORM 4****JULY 2017****TIME: $2\frac{1}{4}$ HOURS****Kenya Certificate of Secondary Education**

1. a.) Carryout food tests for solution Y and X using the reagents provided. (6mks)

Solution	Food substance	Procedure	Observation	Conclusion
Solution X				
Solution Y				

- b.) Tie one side of the visking tubing with one of the threads provided. Pour 5ml of solution X in the visking tubing and tie the other end with the remaining piece of thread. Immerse the visking tubing in solution Y in the beaker and leave the set up for 20 minutes. After 20 minutes perform food test using the solution in the visking tubing and solution in the beaker and record your result in the table below. (3mks)

Solution	Food substance	procedure	observation	conclusion
Solution in visking tubing				
Solution in the beaker				

- c) Which process was being investigated? (1mk)
- d) Account for the results obtained (3mks)
- e) State two importances of the process above in living organisms. (2mk)
2. Study the diagrams set **A₁**, set **E₁**, set **M₁** and set **B** carefully and answer the questions below

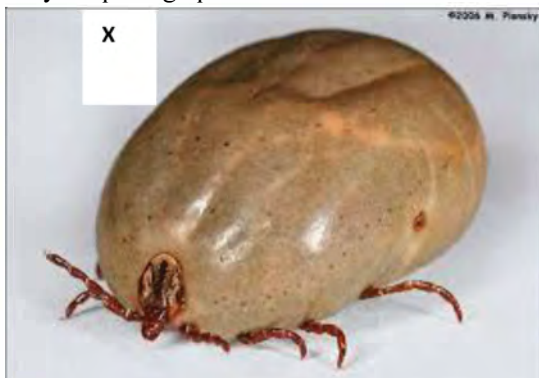


- (a) State the conditions under which each set up was grown. (3mks)
- Set A₁

Set E₁

Set B

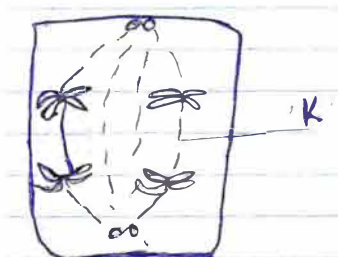
- (b) (i) Name the phenomenon exhibited by seedlings in set E₁ (1mk)
(ii) Give a reason why plants exhibit the phenomenon named in (b) (i) above (1mk)
(c) (i) Name the response exhibited by the seedlings in set B. (1mk)
(ii) Explain how the response named in (c) (i) above occurred (2mks)
(d) (i) State the type of germination exhibited by seedlings in set A₁ and set M₁. (2mks)
Set A₁
Set M₁
(ii) Give a reason for your answer in (d) (i) above (2mks)
Set A₁
Set M₁
(iii) State the mode of dispersal in set A above when mature. (1 mk)
(iv) Name the type of fruit formed by M1 on maturity. (1 mk)
3. Study the photographs below and hence answer the questions that follow



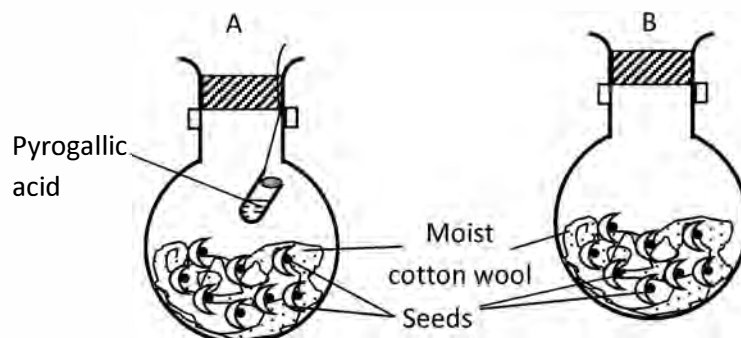
- (i) To which phylum do organisms x, y and z belong to. (1 mark)
(ii) Name the classes to which X, Y and Z belongs to. (3 marks)
(iii) Give two important economic roles of specimen Y. (2 marks)
(iv) Give one harmful effect of specimen X to animals. (1 mark)
(v) With reasons identify two modes of locomotion of specimen Y. (4 marks)

MURANGA SOUTH B**231/1****BIOLOGY****PAPER 1****JULY 2017****TIME: 2 HOURS****Kenya Certificate of Secondary Education****INSTRUCTIONS****ATTEMPT ALL THE QUESTIONS**

1. Write three major differences between plants and animals. (3mks)
2. Explain how water in the soil enters the root hairs of a plant. (2mks)
3. Distinguish between diffusion and osmosis. (2mks)
4. (i) What biological knowledge or study is required in dealing with locusts that infest a maize crop. (1 mk)
- (ii) State the functions of the following cell structures. (2 marks)
- (a) Sap vacuole.
- (b) Nucleolus.
5. Name **three** properties of the cell membrane. (3 marks)
6. List the changes that takes place during inhalation in the breathing cycle of mammal in the following. (4 marks)
- (a) Ribcage and thoracic cavity.
- (b) Diaphragm
- (c) External intercostal muscles.
- (d) Internal intercostal muscles.
7. The diagram below represents a stage during cell division.

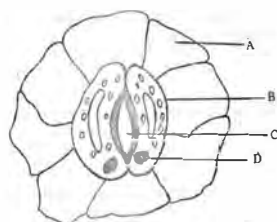


- i) Identify the stage of cell division. (1 mark)
- ii) Give two reasons for your answer (a) above. (2 marks)
- iii) Name the structures labeled K. (1 mark)
8. State one function of each of the following parts of a mammalian ear. (1 mark)
- a) Pinna (1 mark)
- b) Tympanic membrane (1 mark)
- c) Vestibule (1 mark)
9. a) Explain why Lamarck's theory of evolution is not accepted by biologists today. (2 marks)
- b) State two pieces of evidence that support the theory of evolution. (2 marks)
10. a) What is the importance of heartbeat in blood circulation? (2 mark)
- b) If the nerve supply to the heart of a mammal is severed, the rhythmic heart movement will still go on and the heart continues to beat. Explain this observation. (1 mark)
- 11.) Name the causative agent for the following diseases; (1 mark)
- a) Typhoid (1 mark)
- b) Syphilis (1 mark)
12. A student set up an experiment as shown in the diagram below. The set up was kept at room temperature for one week.

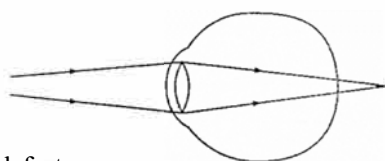


- a) What was the aim of the experiment? (1 mark)
- b) State the expected observation at the end of the experiment. (2 marks)
- c) Account for the observation made in set up A. (1 mark)
- 13 (a) Explain **three** ways in which a red blood cell is adapted to its functions. (3mks)

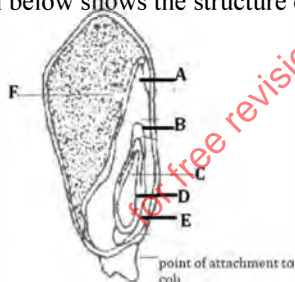
- (b) In which form is carbon (IV) oxide transported in the blood. (2mks)
- 14 (a) Name **three** supportive tissues in plants. (3mks)
- (b) Name the type of muscles found in the gut. (1mk)
- 15 (a) Define the term 'parthenocarp'. (1mk)
- (b) Name **two** plant growth hormones that promote parthenocarp. (2mks)
16. (a) What causes the following diseases? (1mk)
- (i) Diabetes mellitus. (1mk)
- (ii) Diabetes insipidus. (1mk)
- b) An individual shows the symptoms for diabetes mellitus, how would you determine in the school laboratory whether they are positive for the condition? (3mks)
17. A student drew a 3cm long diagram of a plant flower. If the actual length of the flower was 6cm, calculate the magnification of drawing made by the student. Show your working. (2marks)
18. The diagram below represents a specialized plant structure



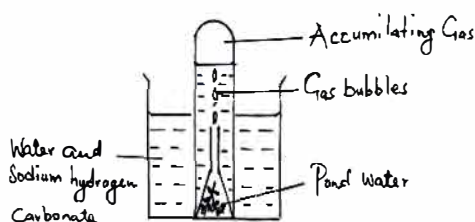
- (a) Name the cells labelled A and B (2marks)
- (b) state the adaptations of cell B to its functions (2marks)
19. State the economic importance of the following excretory products in plants (2marks)
- Nicotine
- Quinine
20. Give **three** distinguishing features of class Aves (3marks)
21. The diagram below shows the position of an image formed in a defective eye.



- (a) Name the defect. (1 mark)
- (b) Explain how the defect named in (c) above can be corrected. (2 marks)
- 22 (a) Name two causes of water pollution (2marks)
- (b) For each cause named in 23(a) above state a control measure. (2marks)
23. The diagram below shows the structure of a monocotyledonous seed



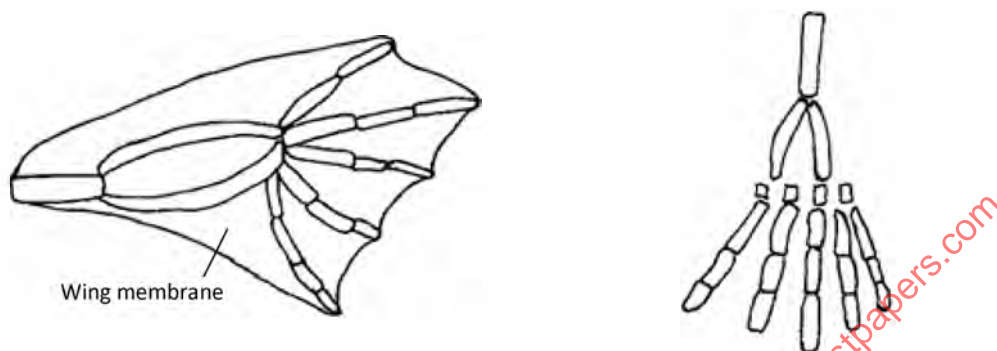
- (a) Name the parts B and D (2marks)
- (b) Name the parts that would stain blue black with iodine solution. (2marks)
24. The apparatus below are used to investigate an aspect of photosynthesis.



- (a) Name the aspect of photosynthesis being investigated. (1 mark)
- (b) How can one verify the identity of the gas that accumulates in test tube? (1 mark)
- (c) State the role of sodium hydrogen carbonate. (1 mark)
- (d) What environmental factor are required in order to give positive results? (1 mark)

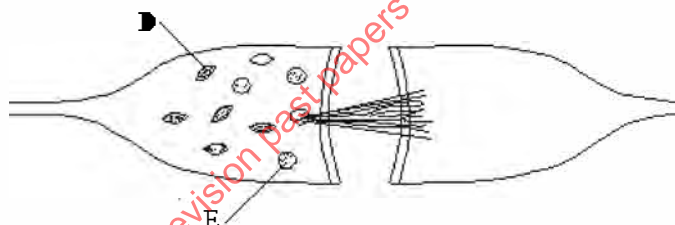
MURANGA SOUTH B
231/2
BIOLOGY
APER 2
FORM 4
JULY 2017
TIME: 2 HOURS

1. In human beings, baldness is controlled by a dominant gene N located on the Y chromosome
 - a) Work out a cross between a bald headed man and his wife (4mks)
 - b) i) What is the probability of the couple getting girls who would develop baldness (1mrk)
 - ii) Give a reason for your answer in b i) above. (1mk)
 - c) Apart from the above trait name **two** other sex linked traits in human beings associated with Y chromosome. (2mks)
2. The diagram **below** shows structures of the bat wing and human arm.



- (a) These structures are thought to have same ancestral origin. State **one** structural similarity and **one** adaptational difference between the two.
 - (i) Structural similarity. (1mk)
 - (ii) Adaptation difference. (2mks)
- (b) Give **two** other examples of structures in nature that show the type of evolution as in (a) above. (2mks)
- (c) Distinguish between the terms 'chemical evolution' and 'organic evolution'. (2mks)
- (d) What is the study of fossils called? (1mk)

3. The diagram below shows a synapse.

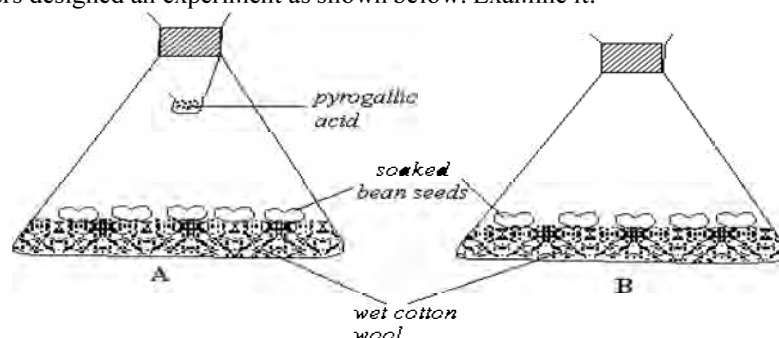


- a) Indicate the direction of the impulse on the diagram. (1 mark)
- b) Label D and E (2 marks)
- c) Compare a simple reflex action with a conditioned reflex action. (3 marks)

Simple reflex	Conditioned reflex

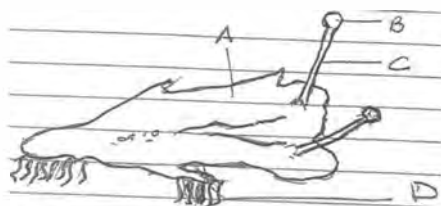
- d) State two functions of hormones in animals. (2 marks)

4. Science club members designed an experiment as shown below. Examine it.



The set up was kept at room temperature for one week.

- What was the aim of the experiment? (1mark)
 - What observation was made after one week in A and B (2marks)
 - (i) Explain the role of water in seed germination. (3marks)
 - What was the role of pyrogalllic acid in the above set up? (1mark)
 - Name one internal factor necessary for seed germination (1mark)
5. The diagram below represents a certain organism observed by a student in an ecological tour.



- Name the parts labeled A and C (2mks)
- Name the division to which the organism belongs (1mk)
- Give two observable reasons for your answer in (b) above (2mks)
- Define the following terms (1mk)
 - Taxa
 - Binomial nomenclature
- Give the name of the following leaf form observed in plants (1mk)



SECTION B.

6. An experiment was carried out to investigate the effect of temperature on the rate of reaction catalyzed by an enzyme. The results are shown in the table below

Temperature ($^{\circ}\text{C}$)	Rate of reaction in mg of products per unit time
5	0.2
10	0.5
15	0.8
20	1.1
25	1.5
30	2.1
35	3.0
40	3.7
45	3.4
50	2.8
55	2.1
60	1.1

- On the grid provided draw a graph of rate of reaction against temperature (6 mks)
- When was the rate of reaction 2.6 mg of product per unit time? (2 mks)
- Account for the shape of the graph between
 - 5°C and 40°C (2 mks)
 - 45°C and 60°C (3 mks)
- Other than temperature name two ways in which the rate of reaction between 5°C and 40°C could be increased (2 mks)
- (i) Name one digestive enzymes in the human body which works best in acidic condition (1 mk)
 (ii) How is the acidic condition for the enzyme named in (e) (i) above attained? (2 mks)
- The acidic conditions in (e) (ii) above is later neutralized
 - Where does the neutralization take place? (1mk)
 - Name the substance responsible for neutralization (1 mk)
- Explain the role of human skin in:
 - Thermo- regulation. (14mks)
 - Protection (6mks)
- (a) State the structural adaptation of the insects tracheal system (10 marks)
 (b) Describe how hormones influence the menstrual cycle.

KASSU

231/1

BIOLOGY

JUNE, 2017

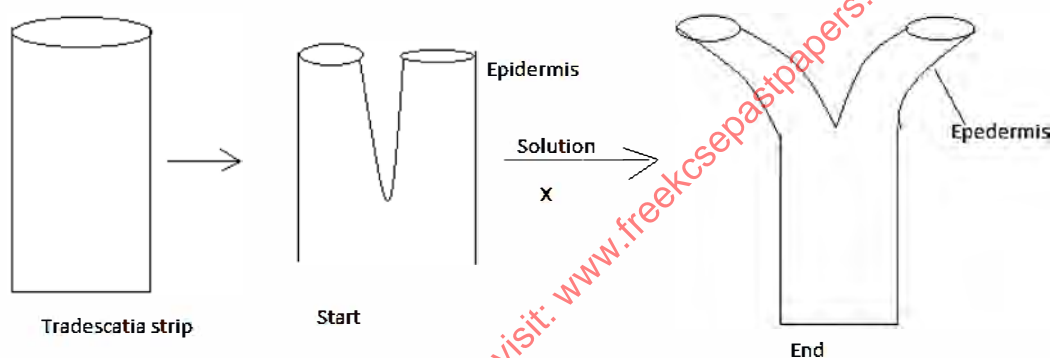
FORM 4

2 HOURS

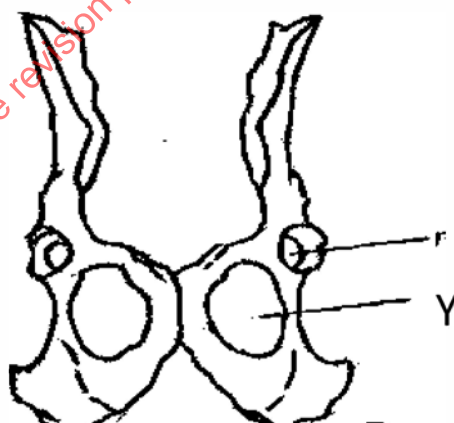
1. State the meaning of the following terms as used in biology. (2 mark)
 - (a) Embryology
 - (b) Ornithology
2. (a) Name **two** systems of classification of living things common to Biologists. (2 marks)
- (b) A banana plant was classified as *Musa parasidiaca* by a taxonomist. Identify the taxonomic units represented by the following words. (2 marks)

Musa

parasidiaca
3. (a) The cell is the basic structural and functional unit of a cell. State three properties of cell membrane in a living cell. (3 marks)
- (b) State **two** major functions of centriole in animal cells. (2 marks)
- (c) Name two types of vacuoles in an amoeba cell. (2 marks)
4. A strip of a herbaceous Tradescantia was cut longitudinally as shown below and placed in solution X. After one hour, the strips appeared as shown below.



- (a) What was the nature of solution X? (1 mark)
- (b) What physiological process was being investigated? (1 mark)
- (c) Account for the results at the end of experiment after one hour. (3 marks)
5. State **two** raw materials required to produce energy in cells for the process of active transport. (2 marks)
6. The pelvic girdle of a mammal is shown below. Study it and answer the questions that follow.



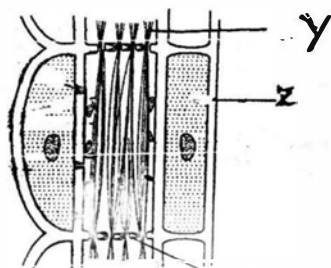
- (a) (i) Name the part labelled Y. (1 mark)

Name :
- (ii) State the three functions of part Y named in (a) (i) above. (1 mark)

Functions: (3 marks)
7. (a) Name **two** elements required by plants for the synthesis of chlorophyll pigment. (2 marks)
- (b) What name is given to plants whose leaves turn yellow due to lack sunlight and the two elements above? (1 mark)
8. Name **two** types of curves obtained during measurement of growth in living things. (2 marks)

9. State three adaptations of xylem vessels to transportation of water.
 10. The structure below is the phloem tissue.

(3 marks)



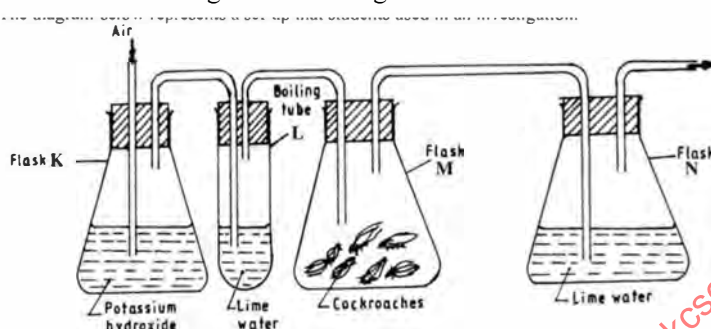
- (a) Name the two main components of the tissue.
 (b) Name the part labelled Y and state its function.
 11. State and explain the role of Heparin in the blood.
 12. State the adaptations of a respiratory surface in terrestrial animals.
 13. The diagram below illustrates gaseous exchange in animals.

(2 marks)

(2 marks)

(2 marks)

(3 marks)



- (i) Why was air passed through potassium hydroxide in flask K?
 (ii) Explain the observations made in Flask N.
 (iii) Why is there no oxygen gas in the air exiting flask N?
 14. (a) Name **three** gaseous exchange surfaces in plants.
 (b) Name the gas released by plants to the atmosphere at night?
 (c) What is the effect of dust on gaseous exchange in terrestrial plants?
 15. Name the major physiological process of respiration that take place;
 (a) At the cytoplasm of the mitochondrion.
 (b) At the matrix of the mitochondrion.
 16. (a) State **two** significance of R.Q values to a biologist.
 (b) The equation below is a respiratory reaction of a certain substrate. Study it and use it to determine its R.Q value.

$$C_{20}H_{40}O_{20} + 20O_2 \rightarrow 20CO_2 + 20H_2O + \text{Energy}$$

 17. (a) State **two** types of variations in the study of genetics.
 (b) Which of the two types of variations mentioned above is influenced by the genotype of an individual only?
 (c) What is a gene locus in genetics?
 18. (a) Explain the biological reasons behind large volume of urine produced by fresh water Tilapia in Lake Victoria.
 (b) Why do insects and birds produce uric acid and not urea as in man?
 19. Name **two** types of diabetes that inflict man.
 20. State using root structures only how you can identify and group a plant as either a dicotyledonae or monocotyledonae using both morphological and anatomical structures.
 21. The organism below is found in kingdom Fungi.



- (a) Using structures X and Y only, why does the organism not qualify as a plant?

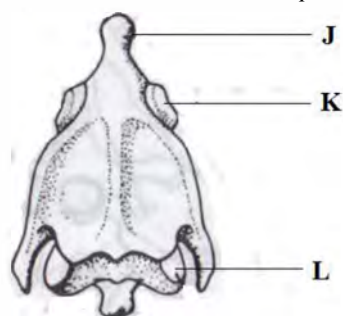
(2 marks)

- (b) What division does the moss and liverwort belong to in kingdom plantae? (1 mark)
22. Name **two** branches of Ecology. (2 marks)
23. What is a receptor? (1 mark)
24. State **two** adaptations of each of the following structures to reproduction in animals. (2 marks)
- (a) Oviduct (2 marks)
- (b) Epididymis (2 marks)
25. State the functions of each of the following cells in the testes. (2 marks)
- (a) Sertoli cells
- (b) Interstitial cells
26. Name **two** bacterial diseases that are sexually transmitted as infections. (2 marks)
27. Name the chemical substances in plants that; (3 marks)
- (a) Promote ripening of fruits
- (b) Flowering in plants
- (c) Leaf fall in plants

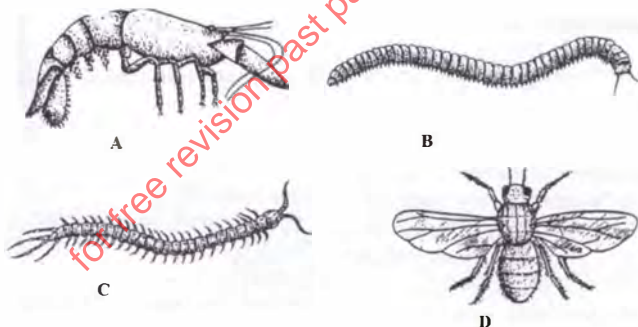
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KASSU
231/2
BIOLOGY
PAPER 2
JUNE 2017
TIME: 2 HOURS

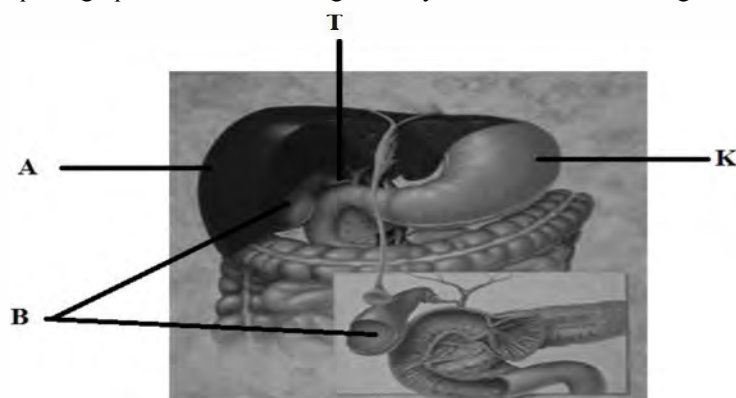
1. Study the vertebra diagram below and then answer the questions that follow.



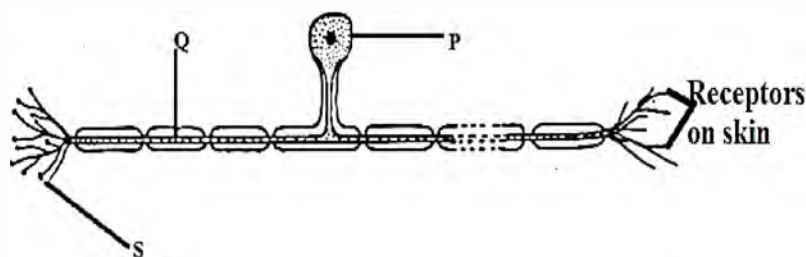
- (a) (i) What is the identity of vertebra? (1 mark)
 (ii) Identify the view presented by the diagram. (1 mark)
- (b) Label the parts shown as: J,K,L (3 marks)
- (c) Name the vertebra that
- (i) Anteriorly articulates the part K. (1 mark)
 (ii) Posteriorly articulates with part L. (1 mark)
- (d) Name the resulting movement attained by the articulation referred to in c (i) (1 mark)
2. (a) Distinguish between a genotype and a phenotype. (1 mark)
- (b) A couple with normal skin pigmentation had three children but their second born was an albino. Using letter A to represent the gene for normal skin colour, work out the genotypes of their children using a genetic cross. (4 marks)
- (c) Apart from albinism, state other three disorders in humans caused by gene mutation. (3 marks)
3. Examine the drawings of the organisms shown below.
- (a) Construct a dichotomous key that can be used to distinguish the organisms using the following observable features **only**. (6 marks)
- (i) Wings
 (ii) Pair of antennae
 (iii) Legs per segment.



- (b) Give two distinguishing features common to the organisms shown above in (a). (2 marks)
4. Use the photograph of mammalian digestive system and associated organs to answer the questions that follow.



- i) Name the structures marked **A**, **R**, **K** and **T**. (4marks)
 ii) Name an acid found in the structure labelled **K**. (1mark)
 iii) Name the juice stored in the structure labelled **B** and give its function. (2marks)
 iv) Label with letter **D** part where function named in (iii) above takes place. (1 mark)
5. The diagram below represents a neurone. Use it to answer questions that follow.



- (a) Identify the neurone. (1 mark)
 (b) Using an arrow, show the direction of impulse. (1 mark)
 (c) Name the parts labelled.
 i) Q (1 mark)
 ii) P (1 mark)
 iii) S (1 mark)
 (d) Name the neurotransmitter substance released at part S. (1 mark)
 (e) Identify the damaged parts of the brain that would exhibit the following symptoms.
 i) Loss of memory. (1 mark)
 ii) Inability to maintain proper body balance and posture. (1 mark)

SECTION B: 40 (MARKS)

Answer question 6 (Compulsory) and either question 7 or 8 in the spaces provided after question 8.

6. An investigation was carried out to determine the concentration of various substances in a river following the discharge of untreated sewage into the river. The results are shown in the table below.

Distance downstream in kilometers	0.0	0.5	1	2	4	6	8	10	12	14	16
Concentration of oxygen(mg/L)	10.0	10.0	8.8	5.8	5.0	4.0	5.0	6.0	8.2	9.4	10.0
Concentration of organic matter(mg/L)	10.0	10.0	16.0	15.2	14.2	13.4	12.6	12.4	11.6	10.0	10.0
Concentration of nitrates(mg/L)	10.0	10.0	10.6	12.2	14.2	15.0	15.2	14.6	12.6	11.4	10.0

- (a) Using the same axes, draw graphs of concentration of named substances in the water against kilometers. (8 marks)
 (b) Identify the point of sewage discharge. (1 mark)
 (c) Account for the changes in the concentration of;
 (i) Organic matter. (2 marks)
 (ii) Dissolved oxygen. (2 marks)
 (d) Nitrates. (2 marks)
 (e) Explain how heavy metals in industrial effluents may accumulate in bodies of humans to toxic levels. (2 marks)
 (f) State four human activities that affect population of animals in game parks. (4 marks)
7. (a) Describe the forces involved in the transport of water up the stem to the leaves. (12 marks)
 (b) Describe the adaptations of the proximal convoluted tubule to its function. (8 marks)
8. (a) State the possible application of the following plant hormones in agriculture.
 (i) Auxins.
 (ii) Gibberellins.
 (b) Explain how each of the following serves as evidence of organic evolution:
 (i) Fossil records. (3 marks)
 (ii) Comparative anatomy. (6 marks)
 (iii) Geographical distribution. (3 marks)

KASSU**BIOLOGY PAPER 3****CONFIDENTIAL****JUNE 2017****REQUIREMENTS**

1. Test tubes in a rack 6
2. 0.1% sodium chloride
3. 1.4% sodium chloride
4. 3 droppers
5. White tile
6. Iodine solution
7. Benedicts solution
8. Amylase / diastase enzyme labelled solution A
9. Water bath
10. Four labels
11. Starch solution labelled solution C
12. Thermometer
13. Measuring cylinder
14. A freshly picked hibiscus twig with a regular flower (should have flower and a leaf or two) labelled M
15. Hand lens
16. Scalpel

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KASSU
231/3
BIOLOGY
PAPER 3
PRACTICAL
JUNE, 2017
1 ¾ HOURS

1. You are provided with 6 test tubes, solution C, droppers, a white tile, iodine solution, 0.1% sodium chloride, 1.4% sodium chloride, Benedicts solution, solution A, water bath and labels.
- a) Label three tests S, T and U. Into each test-tube, place 3ml of solution C.
- b) Put a drop of solution C on a white tile and add a drop of iodine solution. Record your observation. (1mk)
- c) Add 3 drops of 0.1% sodium chloride solution and 2ml of solution A to test tube T. To test-tube U add three drops of 1.4% sodium chloride solution and 2ml of solution A. Sodium chloride is a source of sodium ions. Place the test tube S, T and U in a water bath maintained at 37°C for 30 minutes. Using a drop of the solution from each test-tube repeat the procedure in (a) above and spare the rest for the next question. Record your observation in the table below. (3mks)

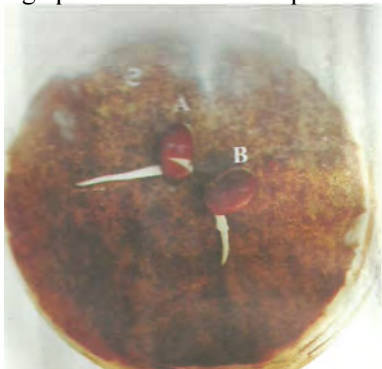
Test-tube	Observation at the end of experiment
S	
T	
U	

- c) i) Put 2cm³ of solution from test-tube S in a clean test-tube and add 2cm³ of Benedict solution, shake then heat the mixture to boil. Record your final observations in the table below. Repeat the procedure for solution T and U. (3mks)

Test-tube	Observation at the end of experiment
S	
T	
U	

- ii) Account for your results in test-tube T and U. (3mks)
- d) Why was the test-tube S included in the experiment? (1mk)
- e) Suggest the identity of solution A. (1mk)
- f) Why was the water bath maintained at 37°C. (1mk)
2. You are provided with specimen labelled M.
- a) Using floral parts and the leaves, classify the plant from which part M was obtained into class and give reasons.
 Class
 Reasons (3mks)
- b) Suggest the pollinating agent for the specimen M and give reasons.
 Pollinating agent - (1mk)
 Reasons (2mks)
- c) Dissect the flower longitudinally into two equal parts and examine one of the parts using a hand lens. Describe the following parts
- i) Androecium (3mks)
- ii) Gynoecium (3mks)
- d) Use the hand lens to observe the pistil closely, draw the pistil only and label the parts. (3mks)

3. The photographs below show an experiment that was set to investigate a certain response in bean seedlings. Examine them.



At the beginning



after 24 hours

- Which response was being investigated? (1mk)
- Account for the observed results for seedling A after 24 hours. (5mks)
- Explain why in seedling B the root continued growing straight down. (2mks)
- Explain the significance of the response you stated in (a) above to the plant. (2mks)

b) Below is a photograph of a mammalian bone, labelled Q.



- Identify the bone (1mk)
- State how the bone is adapted to its functions. (3mks)
- Name the bone that articulates with the bone Q at part labelled X. (1mk)
- Name the specific type of joint formed at this articulation. (1mk)

SUKEMO JOINT EVALUATION TEST- 2017

231/1

BIOLOGY

PAPER 1

(THEORY)

JULY – 2017 Mocks

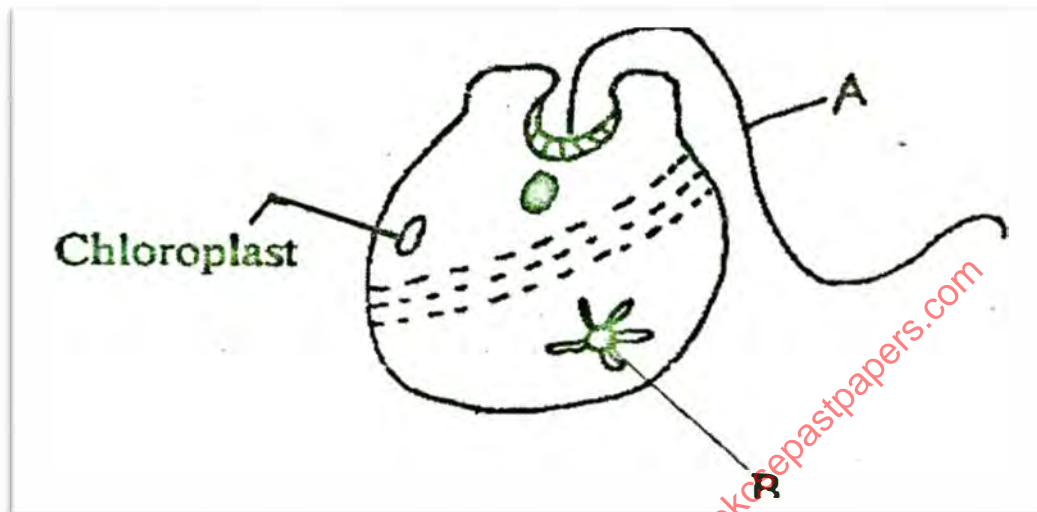
TIME: 2 HOURS

1. State the importance of the following processes in that take place in the nephron of a human kidney

a) Ultra-filtration (1mark)

b) selective reabsorption (1mark)

2. The diagram below represents an organism

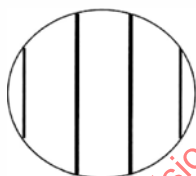


- a) i) In which kingdom does the organism belong (1mark)

ii) Give a reason for your answer. (1mark)

iii) Name the structure labeled A (1mark)

3. A form one student trying to estimate the size of onion cells observed the following on the microscope's field of view.

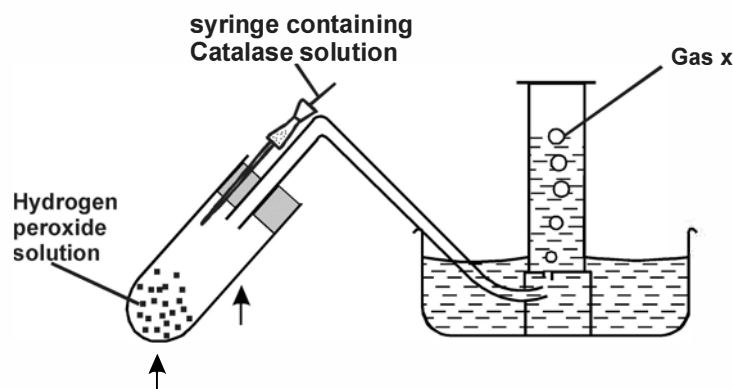


(i) Define the term resolving power. (1mk)

(ii) If the student counted 20 cells across the field of view, calculate the size of one cell in micrometers. (2marks)

4. A student set up an Experiment to investigate a certain physiological process. He placed a 5 cm strip of the stem of a herbaceous plant that had the epidermis intact in distilled water in a beaker for 30 minutes. State and explain the observations made. (3marks)

5. The apparatus shown below was set up by form two students in a certain school.



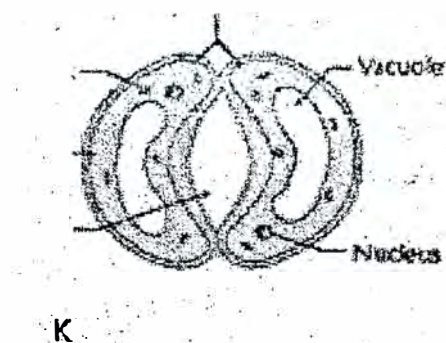
a) Name the gas X. (1 mark)

b) Write a word equation for the reaction which produces the gas. (1 mark)

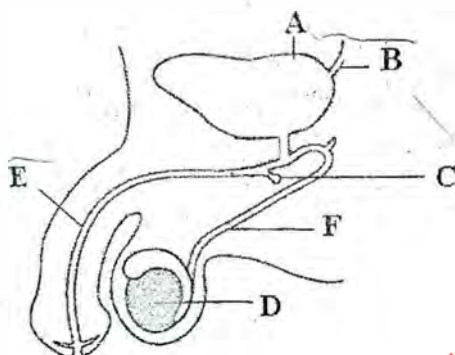
c) Where in the human body does this type of reaction occur? (1mark)

6. Explain why a high concentration of carbon (iv) oxide in the blood may be advantageous to tissues deprived of oxygen in a (2marks)

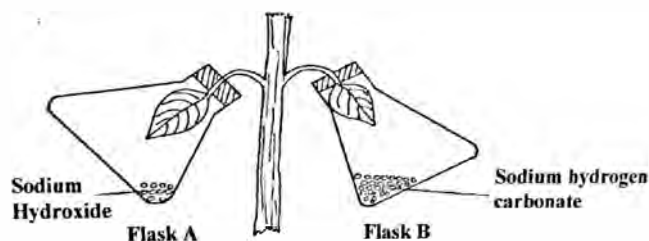
7. The diagram below shows a gaseous exchange structure in plants.



- a) Name part K (1mark)
- b) State two adaptations of the guard cell to its function (2marks)
8. Give the economic importance of the following plant excretory products (3marks)
 - a) Papain
 - b) Colchicine
 - c) Cannabis
9. The diagram below shows a male reproductive system.



- a) Name the parts C and F (2marks)
- b) Name the cells in the parts labeled D that secrete the male hormones called androgen (1mark)
10. a) A person with sickle-cell trait has less than a half the number of red blood cells being sickle celled. Explain why this trait is considered an advantage (2marks)
- b) Name another example of gene mutation (1mark)
11. a) Distinguish between continuous and discontinuous variation (2marks)
- b) What is the importance of genetic variation (1mark)
12. Identify the structure of the cell that performs the following functions
 - a. Synthesize ribosome (1mark)
 - b. Regulate exchange of substances in and out of the nucleus (1mark)
 - c. Division of the cell to form new ones (1mark)
13. A healthy plant was kept in dark for 24 hours. Two of its leaves were enclosed in glass jars as shown in the diagram below. The plants were then exposed to light for hours.



- (i) Leaves in flasks A and B were tested for a food substance. Name the food substance tested for in each of the flasks. (1mark)
- (ii) What were the results of the test stated in (i) above. (2marks)

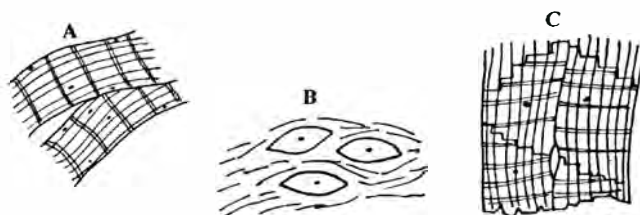
Flask A

Flask B
14. How is the pulp cavity adapted for its functions? (2marks)

15. The table below shows relative rates of transpiration in three different trees growing under similar conditions.

Tree	Relative rate of transpiration
A	195
B	20
C	70

- a) State the most likely habitat for plant **B** (1mark)
 b) State the structural adaptations of the stomata on the leaves of plant **B** (2marks)
 16. What difference would you expect to see between pea seedlings grown for 10 days in total darkness and pea seedlings grown in the light for the same period of time? (3marks)
 17. (a). Define the term industrial melanism (2marks)
 (b). The paddles of a whale and the fins of a fish adapt these organisms to aquatic habitats.
 (i). Name the evolutionary process that may have given rise to these structures. (1mark)
 (ii). What is the name given to these structures? (1mark)
 18. The diagrams below represent three types muscles found on a mammalian body.

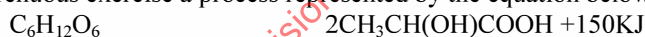


Name the location of each of the three types of muscles on the body. (3marks)

The diagram below shows the position of an image formed in a defective eye.



- a) Name the defect. (1mark)
 b) Explain how the defect named in (a) above can be corrected. (2marks)
 19. During a strenuous exercise a process represented by the equation below takes place in human muscles.

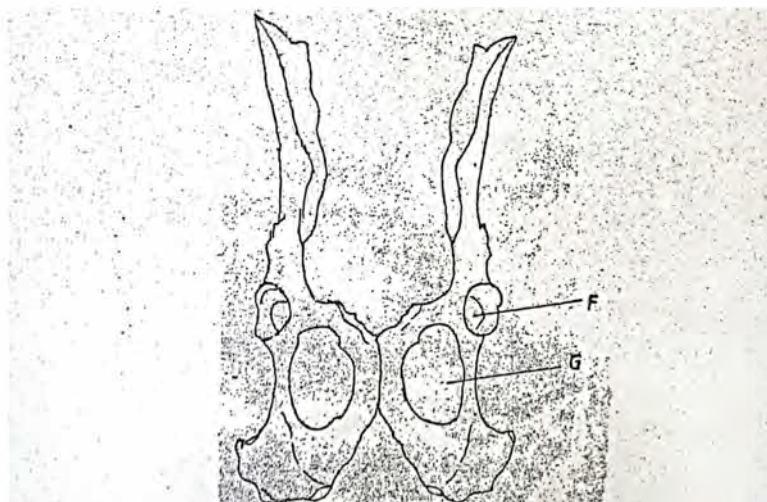


Glucose

Substance X

- a) What is the name of the process above? (1marks)
 b) Name substance X (1mark)
 c) Explain what happens in the body when substance X accumulates in the muscles in high amounts. (1mark)
 20. Describe three activities that takes place in the human skin when the body temperature falls below normal. (3marks)
 21. State the effects of dumping untreated sewage into a river. (3marks)
 22. (a). What is meant by double fertilization in plants? (2marks)
 (b). Mention two developmental changes that takes place in the ovary of a flower after fertilization. (2marks)
 23. Cabbage seedlings in a certain farm were attacked by a viral disease that made them to grow tall and fail to form drum head. The tall varieties were selfed and produced 134 drum head offsprings and 400 tall offsprings. What was the effect of the virus on the genetic make-up of the cabbage plants? (2marks)
 24. What are the functions of the following parts of the human ear?
 a) Semi circular canal. (1mark)
 b) Cochlea (1mark)
 25. State one survival value of each of the following responses in plants:
 (i). Thigmotropism (1mark)
 (ii). Phototropism (1mark)

26. The diagram below shows two fused bones of a mammal.



a) Identify the fused bones.

(1mark)

b) Name the:

(i) Bone that articulates at the point labeled F.

(1mark)

(ii) The hole labeled G

(1mark)

27. Distinguish between synapse and synopsis.

(2marks)

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SUKEMO JOINT EXAMINATION TEST - 2017

231/2

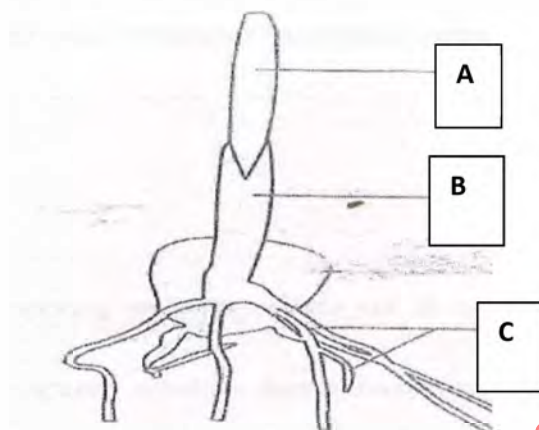
BIOLOGY PAPER 2

THEORY

JULY/AUGUST 2017

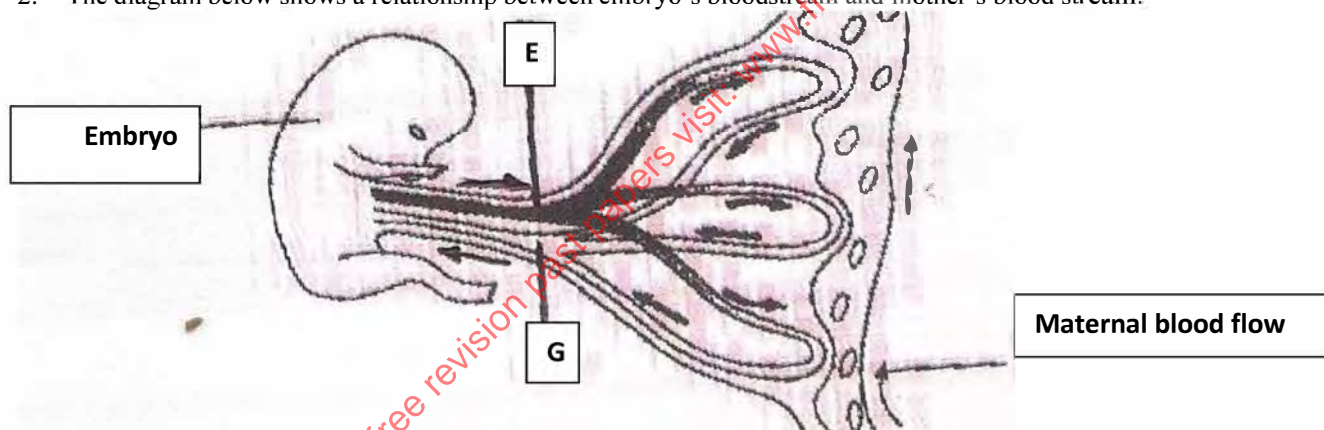
TME: 2 HOURS

1. Below is a diagram of a maize seedling



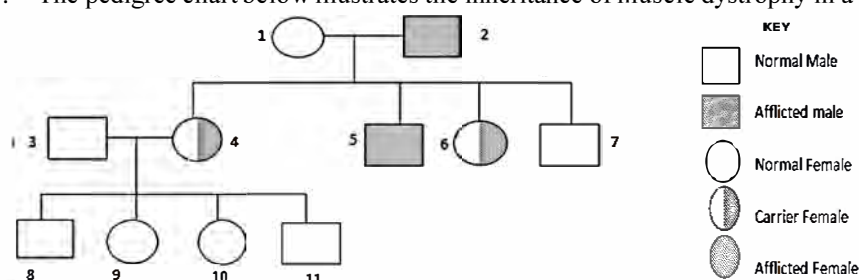
- a) i) Name the class to which it belongs (1mk)
 ii) Give a reason your answer above (1mk)
 b) Name the structure labeled B (1mk)
 c) State the function of the parts labeled A, B and C (3mks)
 d) Name the type of germination exhibited by the seedling. Give reason for your answer (2mks)

2. The diagram below shows a relationship between embryo's bloodstream and mother's blood stream.



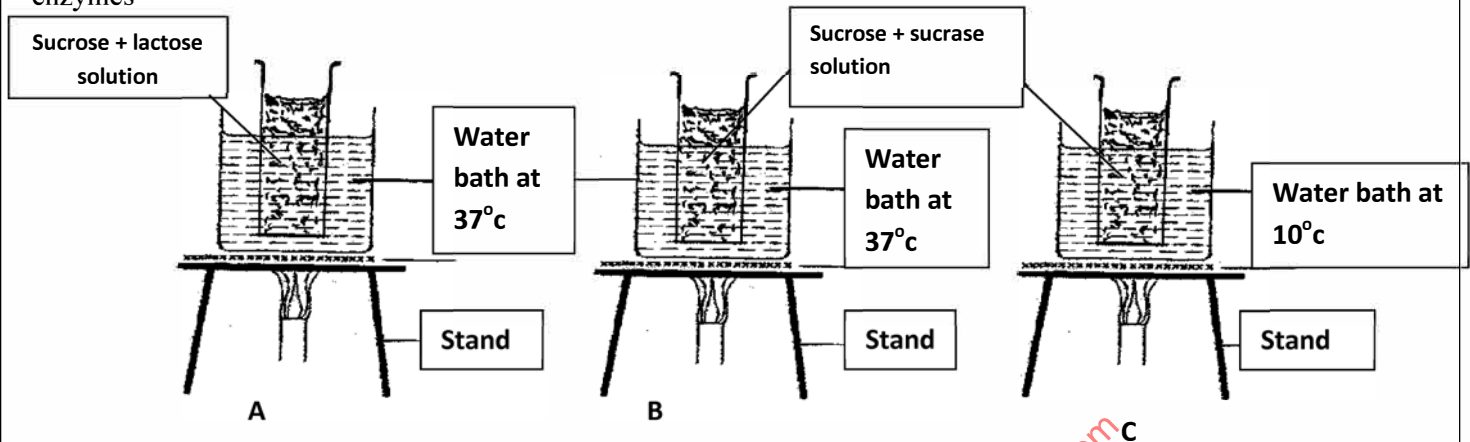
- a) Give the names of the parts labeled E and G (2mks)
 b) Name one substance that is at high concentration in E. (1mk)
 c) i) In which organ does this kind of exchange shown above occur? (1mk)
 ii) How is the structure you have named in c) i) above adapted to its function. (2mks)
 d) i) Which substance surrounds the embryo during its development. (1mk)
 ii) State one role of the substance you have named in d) i) above. (1mk)

3. The pedigree chart below illustrates the inheritance of muscle dystrophy in a given family.



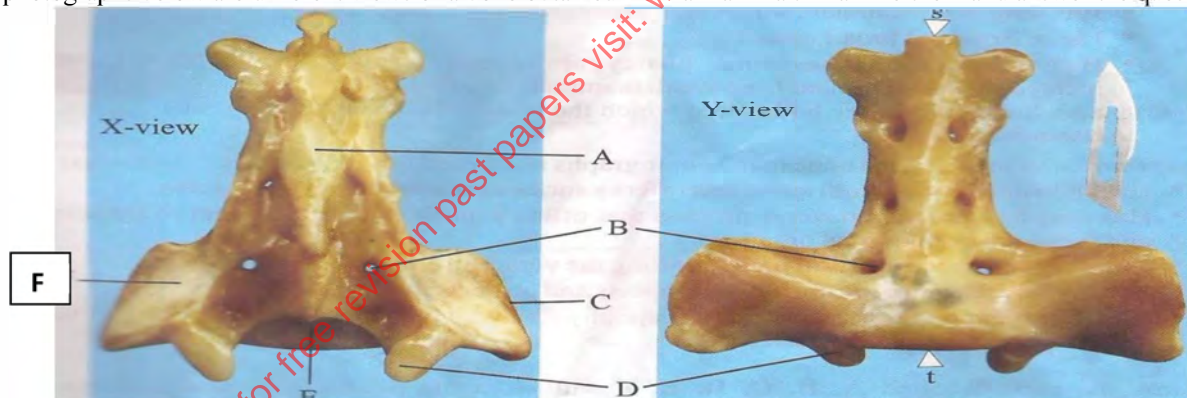
- a) Suggest the possible genotypes of individual 2 and 4. Use the letter **D** to represent the gene for normal muscle formation. (2mks)
- b) Explain why there are no male carriers (2mks)
- c) Work out the genotypes of the offspring's from individual number 4 and an afflicted male. (4mks)

4. The diagram below represent set ups arranged by a group of students investigating certain characteristics of enzymes



The students tested the contents for sucrose in the three test tubes after 30 minutes.

- a) In which of the three set ups was the test for sucrose negative? (1mk)
- b) For each of the test tube where the test for sucrose was positive, explain why? (2mks)
- c) State two characteristics of enzymes the students were investigating. (2mks)
- d) Explain the role of hydrochloric acid when testing for sucrose presence in food. (1mk)
- e) Define the term competitive inhibitor as used in study of enzymes. (1mk)
- f) Apart from the characteristics of enzymes investigated in the set up above, name another characteristic of enzymes. (1mk)
5. The photographs below are different views of a bone obtained from a mammal. Examine them and answer the questions below



- a. i) identify the bone. (1mk)
- ii) Give reason for your answer in (a) i) above (1mk)
- iii) Name the region of the body from which the bone was obtained. (1mk)
- iv) Name the bone that articulates on the surface labeled **F** (1mk)
- b) Identify the views of the photographs. X, Y (2mks)
- c) Name the parts labeled **A**, **B**, **C** and **D** in the photographs (2mks)

SECTION B (40 MKS)

Answer question 6 (compulsory) and either 7 or 8 in the spaces provided at the end of question 8.

6. The table below how the quantities of sweat and urine vary with external temperature.

External Temperature ($^{\circ}\text{C}$)	0	5	10	15	20	25	30	35
Urine cm^3/h	100	90	80	70	60	50	40	30
Sweat cm^3/h	5	6	10	15	30	60	120	200

- a) Using the same grid, draw graphs of quantities of urine and sweat produced against external temperature. (6mks)
- b) At what temperature is the amount of sweat and urine produced equal. (1mk)
- c) Account for the amount of sweat produced as the temperature rises. (3mks)
- d) Explain the observations made on the amount of urine produced as temperature rises. (4mks)
- e) Explain how the erector pili muscle help in temperature regulation when it is cold. (4mks)

-
- f) How does **Anti diuretic hormone** affect the amount of urine produced by a mammal per day. (2mks)
7. Describe how the various parts of mammalian ear are adapted to their functions. (20mks)
8. a) Explain inspiration in the gills of bony fish (10mks)
- b) Explain the factors affecting the rate of breathing in humans. (10mks)

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SUKEMO JET EXAMINATION 2017
231/3
BIOLOGY CONFIDENTIAL
JULY 2017

INSTRUCTIONS TO SCHOOLS

The information contained in this paper is to enable the head of the school and the teacher in charge of Biology to make adequate preparations for this year's Biology practical examinations. NO ONE ELSE should have access to this paper or acquire knowledge of its contents. Great care MUST be taken to ensure that the information herein does not reach the candidate either directly or indirectly. The teacher in charge of Biology should NOT perform any of the experiments or give any information related to these instructions to the candidates.

Each candidate will require the following:

- 4 test tubes
- Test tube rack
- 3 droppers
- Means of labeling
- Means of heating/ Bunsen burner
- 10 mls solution J (Fresh milk)
- Filter paper
- Benedicts solution
- 10 % sodium hydroxide solution.
- 1 % copper sulphate solution
- A ruler 30cm long
- Medium sized irish potato labeled specimen **S** supplied in a Petri dish
- a piece of fresh liver labeled specimen **Z** enough to obtain cube of 1cm by 1cm by 1cm.
- 10ml hydrogen peroxide
- scapel
- 2 boiling tube
- Glowing splint

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SUKEMO JET EXAMINATION 2017

231/3

BIOLOGY PRACTICAL

Paper 3

Time: 1 $\frac{3}{4}$ Hours

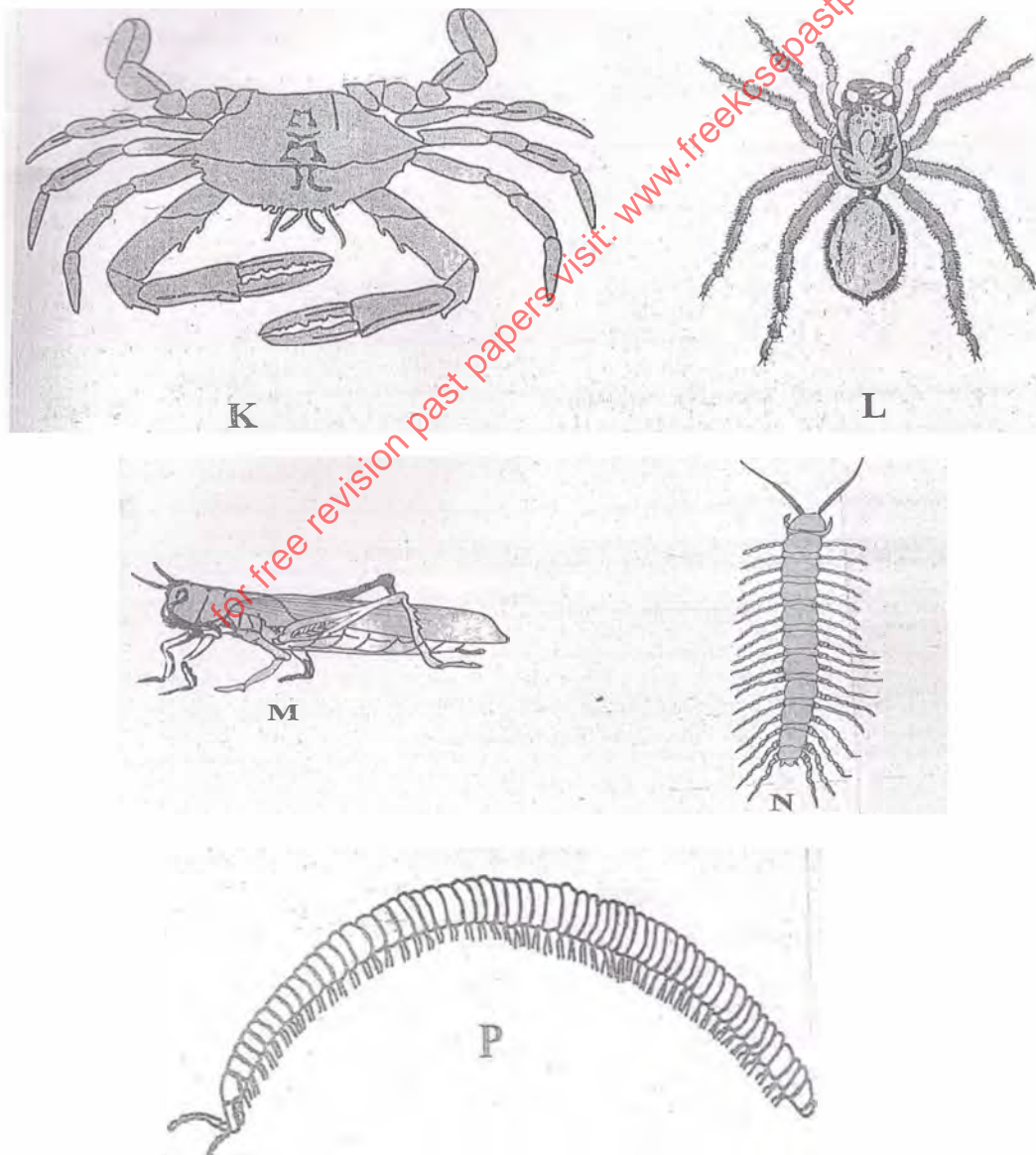
1. You are provided with
- Specimen S
 - Specimens Z
 - 10cm³ of hydrogen peroxide
 - Food substance J
- a) Cut a cube of specimen S measuring 1cm by 1cm by 1cm and place in a boiling tube labeled A. Repeat the procedure using specimen Z and place in a second boiling tube labeled B. To each of the boiling tubes add 5cm³ of hydrogen peroxide provided. Record your observations. Test the gas produced with a glowing splint. (2marks)

Test tube	Observation
A	
B	

- b) Write an equation for the reaction taking place in boiling tube A and (1mark)
- c) Explain the difference in the observations made between the reactions in test tube A and B (3marks)
- d) Using the reagents and filter paper provide carry out the tests in substance J: (9 marks)

Food substance	procedure	observation	Conclusion

2. You are provided with photographs of specimens K, L, M, N and P



Using observable features answer the questions that follow:

- a) With reasons state the phylum of the organisms:
 - i) Phylum (1 mark)
 - ii) Reasons (2marks)
- b) With a reason in each case give the class of:
 - i) Specimen K (1 mark)
 - Class
 - Reason (1 mark)
 - ii) Specimen N (1 mark)
 - Class
 - Reason (1 mark)
- c) State **two** adaptations of specimen M for locomotion (4 marks)
- d) State **one** economic importance of specimen P (1 mark)
3. You are provided with three sets of seedlings, labeled; Set A₁, Set A₂ and Set B examine them and use them to answer the questions that follow.



- (i) Name the phenomenon exhibited by seedlings in set A₂ (1mark)
- (ii) Give a reason why plants exhibit the phenomenon named in (i) above. (1mark)
- (iii) Name the response exhibited by the seedlings in set B (1mark)
- (iv) Explain how the response named in (iii) above occurred. (3 marks)
- (v) State five differences between seedlings in set A₁ and A₂. (5 marks)
- (vi) State the conditions under which the seedlings in set A₁ and A₂ were grown. (2 marks)

MOKASA
231/1
BIOLOGY

Theory

Paper 1

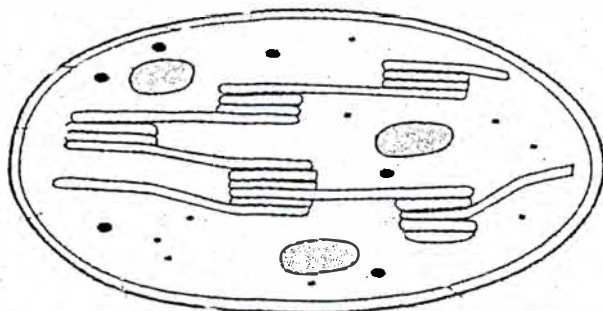
2017

Time: 2 Hours

1. Define the following branches of Biology
 - (i) Physiology (1 mark)
 - (ii) Dermatology (1 mark)
2. The cell membrane is said to be polarized. State the meaning and significance of a polarized membrane

Meaning (1 mark)

Significance (1 mark)
3. The diagram below represents an organelle



- a) State the function of the organelle (1 mark)
- b) Label on the diagram, the parts of the organelle where;
 - (i) Oxygen gas is produced as a byproduct (1 mark)
 - (ii) Carbon (iv) oxide is fixed (1 mark)
4. State the functions of bile salts (2 marks)
5. Name **two** classes of phylum arthropoda whose members have a cephalothorax (2 marks)
6. Name the distinguishing features of class Aves (2 marks)
7. State **two** ways in which pteridophyta differ from spermatophyta (2 marks)
8. The diagram below shows the gametophyte of a fern plant

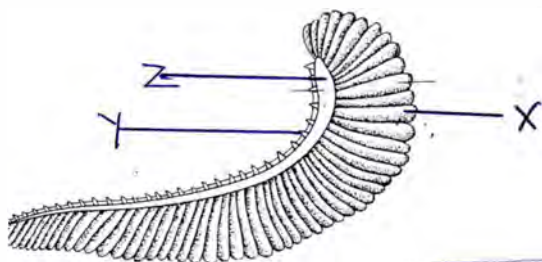


Name the structure shown above (1 mark)

Name the part labelled B and D (2 marks)

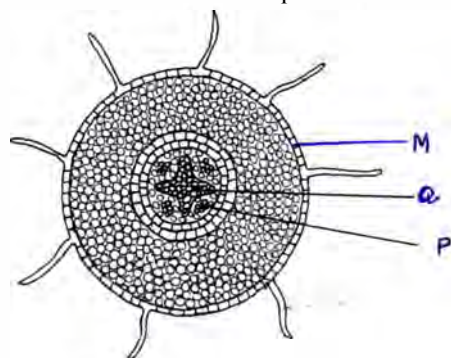
9. a) Define the term "Alternation of generation" (1 mark)
- b) Name **two** plant divisions which exhibit alternation of generation (2 marks)
- c) State the importance of gametophyte to a sporophyte (1 mark)
10. The equation below represents oxidation of a certain food substance.

$$C_{18}H_{36}O_2 + 26O_2 \rightarrow 18CO_2 + 18H_2O$$
- a) Calculate the respiratory quotient of the substance being oxidized. (2 marks)
- Name the likely food substance being oxidized (1 mark)
- State **one** reason why respiratory quotient values are important to work out (1 mark)
11. Study the diagram below and answer the questions that follow.



- a) Name the parts labelled

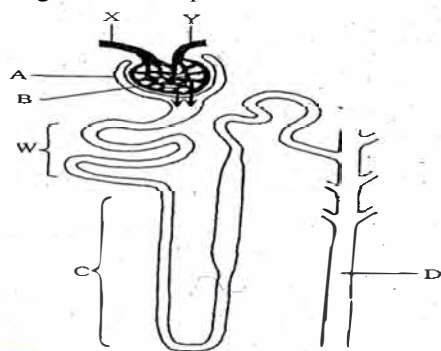
- (i) Y (1 mark)
 (ii) Z (1 mark)
 (iii) X (1 mark)
 b) State an adaptation of each part labelled Y and Z in the diagram (3 marks)
 12. Study the section below and answer the questions that follow.



- a) Identify the section (1 mark)
 b) Name the parts labelled M and Q (2 marks)
 13. State **two** components of a phloem (2 marks)
 14. Explain what happens in prophase I of meiosis (1 mark)
 15. a) Define taxis (1 mark)
 b) State **two** biological importance of tactic responses (2 marks)
 16. The figure below shows a stem of a plant growing around a tree trunk.



- a) Identify the type of response which causes the twisting growth (1 mark)
 b) Explain how the twisting process is accomplished (2 marks)
 17. Define the following terms used in evolution and give an example in each case.
 a) Homologous structures (2 marks)
 b) Analogous structures (2 marks)
 18. Explain comparative embryology as an evidence of organic evolution (3 marks)
 19. State the demerits of Lamarck's theory of evolution (2 marks)
 20. State the functions of the following parts of a germinating seed.
 a) Coleorhiza (1 mark)
 b) Coleoptile (1 mark)
 21. a) A horse and a donkey belong to the same genus. The two organisms may interbreed to produce an infertile offspring. Explain (1 mark)
 b) Distinguish between classification and Taxonomy (1 mark)
 22. The diagram below represents the functional unit of a mammalian kidney. Study it and answer the questions that follow.



- a) Identify the structure (1 mark)
 b) Select the letters representing two structures between which ultrafiltration takes place (2 marks)
 23. a) Describe the role of hypothalamus in thermoregulation (2 marks)
 b) State the role of the following hormones in homeostasis
 (i) Insulin (1 mark)

- (ii) Glucagon (1 mark)
24. a) State the significance of a test cross in genetics (1 mark)
- b) State the function of Deoxyribonucleic acid (DNA) molecule (1 mark)
25. What is the adaptive advantage of sickle cell trait (2 marks)
26. Below are two different views of a mammalian bone. Study it and answer the questions that follow.



- a) Identify the bone (1 mark)
- b) Give a reason for your answer in (a) above (1 mark)
- c) Name each of the two views (2 marks)
27. Explain how plants compensate for their inability to locomote (3 marks)
28. The photographs below show three bean seedlings that are of same age but were grown under different environmental conditions.



- a) Based on the external appearance of the seedlings, suggest the conditions under which each of them was grown (3 marks)
- b) Give **two** differences between R and S (2 marks)

MOKASA

231/2

BIOLOGY PAPER 2

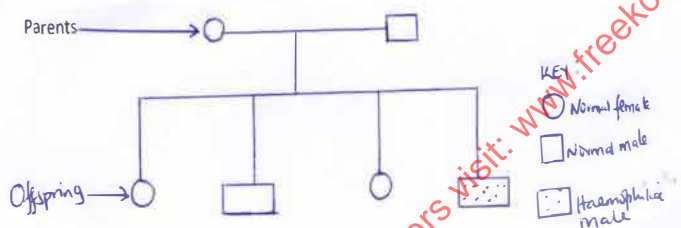
THEORY

TIME: 2 HOURS

SECTION A (40 Marks)

INSTRUCTIONS – Answer **ALL** the questions in this section in the spaces provided.

1. a) State the roles of the following organelles. (3 marks)
 - i) Ribosome
 - ii) Lysosome
 - iii) Centriole
- b) Give three differences between a plant and animal cells. (3 marks)
- c) Suggest two ways the sperm cell is specialized. (2 marks)
2. a) State three features of the gaseous exchange surface for an aquatic organism. (3 marks)
- b) Name the form in which the following compounds are transported in blood. (3 marks)
 - i) Oxygen
 - ii) Carbon (II) oxide
- c) Explain oxygen debt. (2 marks)
- d) Suggest the advantage of transporting most carbon (IV) in red blood cells. (1 mark)
3. a) Give three hormones that influence the female reproduction in humans. (3 marks)
- b) State the roles of the following structure in the human male. (2 marks)
 - i) Prostate gland
 - ii) Cowper's gland
 - iii) Epididymis
- c) What is gestation period? (1 mark)
4. Hemophilia is due to a recessive gene. The gene is sex-linked and located on the X-chromosome. The figure below shows some offspring from phenotypically normal parents. (1 mark)



- a) i) What are the parental genotypes? (2 marks)
 Father _____ Mother _____
 ii) Work out the genotypes of the offspring. (4 marks)
- b) State **two** other disorders in humans that result from gene mutation. (2 marks)
5. a) Define the phototropism. (1 mark)
- b) Name the hormone involved in phototropism. (1 mark)
- c) Explain how the hormone named in 5 (b) above causes phototropism in a shoot of a young seedling. (3 marks)
- d) i) State the function of a kinesis. (1 mark)
- ii) Explain how the kinesis works to achieve its function. (2 marks)

SECTION B (40 MARKS)

Answer question 6 (Compulsory) and either question 7 or 8 in the spaces provided

6. The data provided below represent populations of a predator and its prey over a fifty years period.

TIME IN YEARS	POPULATION IN RELATIVE NUMBERS	
	POPULATION OF P	POPULATION OF Q
5	24500	17000
10	30000	20500
15	33500	26000
20	33500	30000
25	31000	33000
30	27000	32000
35	25000	30000
40	29000	27500
45	32500	28000
	34000	28500

- (a) i) Using the same axes, draw graphs of the relative populations of **P** and **Q** against time. (7 marks)
- ii) With a reason, identify the curve that represents the prey. (2 marks)
- iii) Account for the two populations between 25 and 32 years. (2 marks)
- iv) Which years were the two populations equal? (2 marks)
- v) Apart from predation, state **three** biotic factors that may have led to the decline of the prey population. (3 marks)
- b) Describe the hazards of air pollution by Sulphur(IV)Oxide. (4 marks)
7. a) Explain how water move up the plant from the xylem in roots to the leaves. (8 marks)
- b) Describe the process of digestion of a meal consisting of lean meat and rice. (12 marks)
- OR
8. Describe the process of urine formation in man. (20 marks)

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MOKASA
END TERM EXAMS
BIOLOGY PAPER 3
CONFIDENTIAL

- @ candidate to have 3 ml of solution C; a mixture of glucose and milk/egg albumen/protein
- 3 test tube in a test tube rack plus a test tube holder
- A 10 ml measuring cylinder

Shared

- Source of heat
- Benedict's solution
- DCPIP supplied with a dropper
- Cupper II sulphate with a dropper
- Sodium hydroxide solution

MOKASA
231/3
BIOLOGY
PAPER 3
PRACTICAL
2017
TIME: 1 ¼ HOURS

1. You are provided with a food sample labelled solution C. Using the reagents provided, carry out tests to identify the food substances present in the sample. (11marks)

TEST FOR	PROCEDURE	OBSERVATION	CONCLUSION
1. Reducing sugars			
2. Ascorbic acid			
3. Proteins			

From the results above

- State the part of the digestive system where the digestion of the food substance begins. (2marks)
 - Name the deficiency disease arising from the food substance C. (1mark)
2. The photographs below show floral structures and germination process. Study them carefully then answer the questions that follow.



W

D

L

PLATE I



PLATE II

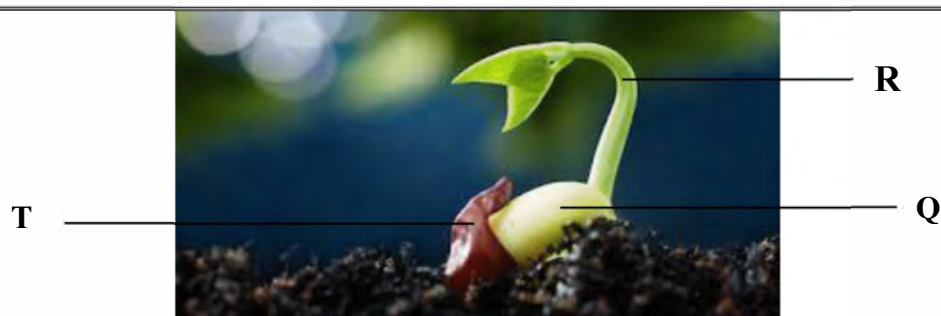
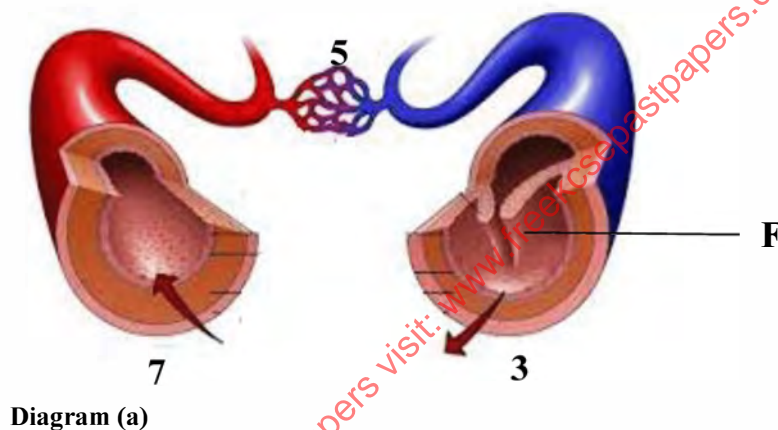


PLATE III

- a) i) Describe the type of the ovary in **plate I**. (1mark)
 ii) With reasons name the agent of pollination of the flower in **plate I**. (1mark)
 Agent of pollination
 Reasons (3marks)
 iii) Identify the parts labeled in **plate I**. W, D, L (3marks)
- b) **Plate III** shows a plant obtained from **plate II**.
 i) Identify the parts labelled. R,T,Q (3marks)
 ii) Explain the functions of the parts **R** and **T**. (2marks)
3. Below are **diagrams** labelled (a) and (b) of specimens obtained from an animal. Examine them carefully then answer the questions that follow.



- (a) i) In diagram (a), identify the structures labelled. 3,5,7 (3marks)
 ii) Give a reason for the identities 3 and 7 in (i) above. (2marks)
 iii) Explain how blood vessel **5** is adapted to its function. (2marks)
 iv) State the function of the structure labelled **F**. (1mark)

- v) Identify the process by which certain materials pass out of structure **5**. (1mark)
- (b) **Diagram (b)** shows the components in **diagram (a)**.
- i) Identify structure **Hii**. (1mark)
- ii) Using an observable feature only, explain how the structure named in **b(i)** above is adapted to its function. (1mark)
- iii) In what form is carbon(IV) oxide transported in structure **Hii** above. (1mark)
- iv) Name a hereditary disease represented by structure **Hi**. (1mark)

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MURANGA SOUTH C

231/1

BIOLOGY

PAPER 1

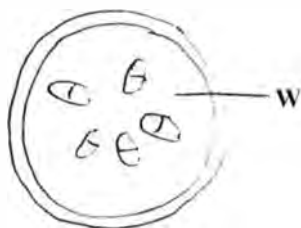
FORM 4

JULY 2017

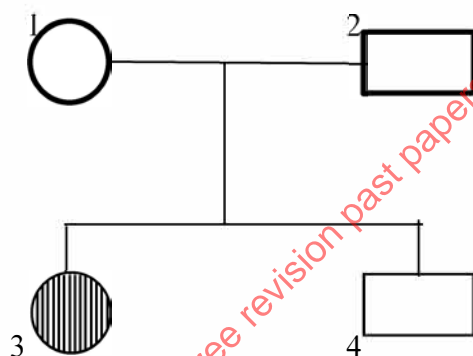
TIME: 2 HOURS

INSTRUCTIONSATTEMPT ALL THE QUESTIONS

1. (a) Name the hard outer covering of members of the Phylum Arthropoda. (1 mk)
 (b) State two roles of the structure named in (a) above. (2 mks)
 (c) State one other characteristic of the phylum.
2. The diagram below shows a transport section of a plant organ of the plant of class dicotyledonee.

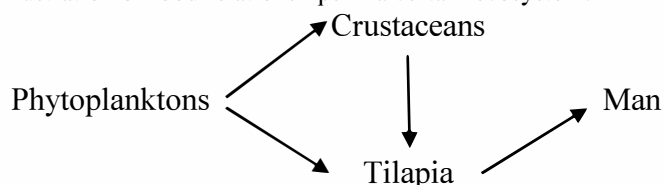


- i) Identify the plant organ. (1 mk)
- ii) State two differences that would be observed from a similar section from a monocotyledonous plant. (2 mks)
- iii) Name the plant labelled W.
3. (a) Name the disease that is characterized by contraction and hardening of the liver.
 (b) State two roles of the liver in homeostasis.
4. The pedigree below is of a family in which one of the member (shaded) has an autosomal recessive condition. The alleles involved are q and g.



- (a) Give the possible genotypes for members 1 and 4. (2 mks)
- (b) State two characteristics that are controlled by a gene located on Y chromosome. (2 mks)

5. Below is an illustration of food relationships in a certain ecosystem.

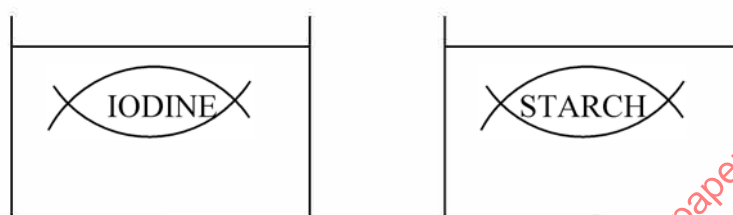


- (a) Identify the organism that occupies two different trophic levels. (1 mk)
- (b) Explain why concentration of heavy metals in the ecosystem would have the greatest impact on man.
- (c) Which method would be used to estimate the population of fish in the ecosystem?
6. Distinguish between divergent and convergent evolution.
7. Name one product of the light reaction of Photosynthesis that is not used in the dark stage. (1 mk)

8. Samples of atmosphere and exhaled air were analyzed by four groups of students for Oxygen and Carbon (IV) Oxide content. The following results expressed in volumes per thousands were obtained.

	Exhaled Air	Atmosphere
Amount of Oxygen	160	200
Amount of Carbon(IV) Oxide	300	41

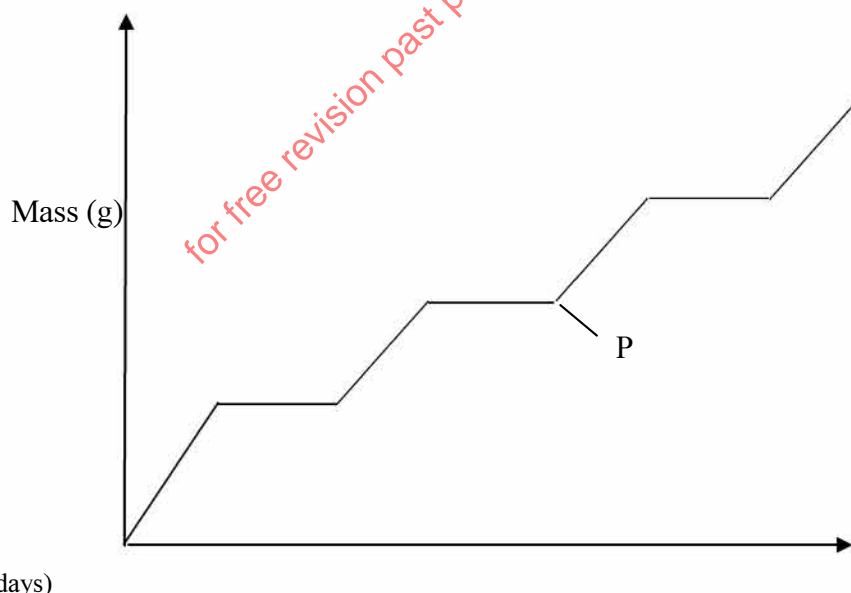
- Explain the differences in volume of each gas between the atmosphere and exhaled air. (2 mks)
9. State two roles of green plants in a fish pond other than providing food. (2 mks)
10. Below is a portion of a DNA strand.
Write (i) DNA complimentary strand. (1mk)
(ii) RNA complimentary strand. (1mk)
11. Explain why a desert Kangaroo rat has a kidney with long loops of herile and small glomeruli. (2 mks)
12. State two scientific skills that can be;
(a) Developed through study of Biology.
(b) State two functions of revolving nose piece.
13. A group of students set up an experiment to demonstrate a certain process as shown below.



After 10 minutes the students recorded their observations as shown below.

	Observation	
	Inside the tube	Outside the tube
1.	Blue ink	No color change
2.	No color change	Blue black color

- (a) Name the process. (1 mark)
- (b) Explain the results in set up 2.
14.
(a) What is natural selection? (3 marks)
(b) State two evolutionary characteristics that adapt man to his environment.
15. The graph below represents growth of a certain animal.



- (a) Identify the growth pattern above. (1 mk)
- (b) Name process P.
- (c) Which hormone is responsible for the process?
16.
(a) Distinguish between hypertonic and hypotonic solution. (2 mks)
(b) Explain why amoeba does not burst when placed in a hypotonic solution. (1 mk)
17. State two functions of muscles found in the alimentary canal of humans.

18.

(a) A nucleus of a fertilized ovum contains 23 pairs of chromosomes. How many chromosomes would be found in the liver cell of the same organism?

(b) What is the advantage of lack of nucleus in mammalian red blood cells?

(1 mk)

19. Describe how the iris controls the size of the pupil when exposed to bright light.

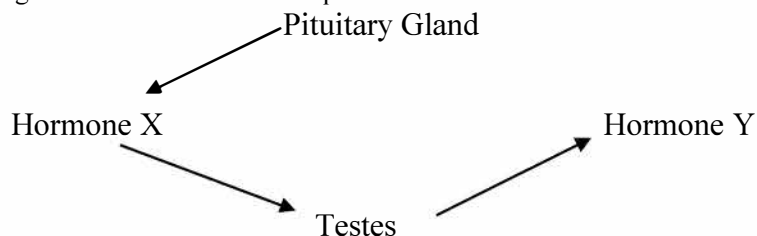
(3 mks)

20. Which cell organelle would be abundant in the

(a) Palisade cell

(b) Skeletal muscle

21. Study the diagram below and answer the questions that follow.



(a) Identify hormone X, Y

(b) State two characteristics that would be observed in a male who fails to secrete hormone Y.

22.

(a) State two characteristics of insect pollinated flower.

(2 mks)

(b) What is the role of diffusion in pollination?

(1 mk)

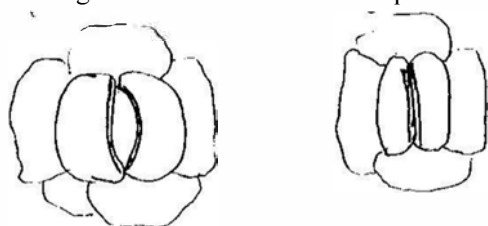
23.

(a) Describe the path taken by Carbon (IV) Oxide from the tissues of the insect to the atmosphere.

(3mks)

(b) State one gaseous exchange surface in a frog.

24. Study the diagrams below and answer the questions that follow.



State the three theories that explain the phenomenon above.

(3mks)

25.

(a) State the products of anaerobic respiration in plants.

(3mks)

(b) Define respiratory quotient.

(1mk)

26.

(a) State 3 ways in which flowering plants excrete their wastes.

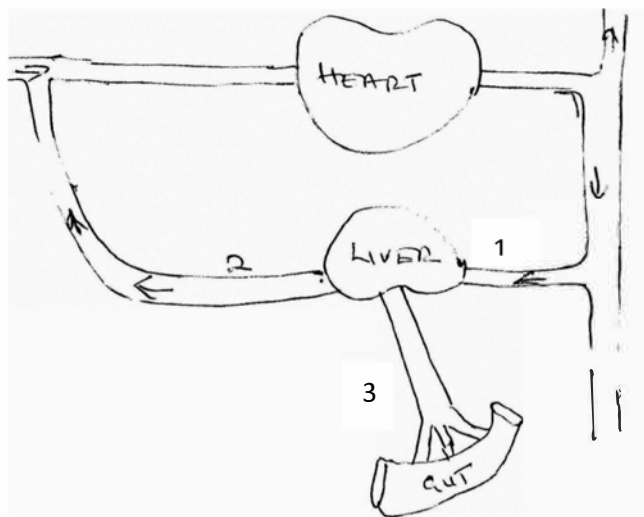
(3mks)

(b) State one use of rubber.

(1mk)

MURANGA SOUTH C**231/2****BIOLOGY****PAPER 2****JULY 2017****TIME: 2 HOURS****Kenya Certificate of Secondary Education**

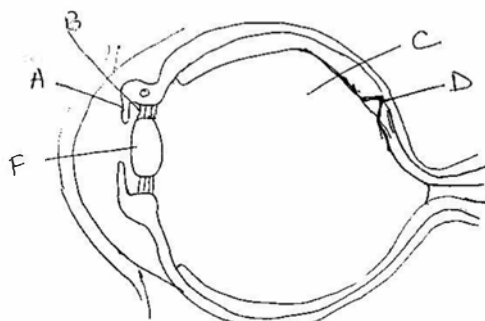
1. Below is a sketch diagram showing part of a mammalian circulatory system. Study it and answer the questions that follow.



- (a) Name blood vessels 1 and 3. (2mks)
 (b) State two structural differences between vessels 1 and 2. (2mks)
 (c) Explain why the level of blood sugar in vessel 2 would be higher than in vessel 3 during fasting.
2. Cells of a certain herbaceous plant were found to have an average diameter of 2.5 μm . The cells were placed in varying concentrations of sugar solution. The average diameter of the cells in each solution was determined and the results obtained were as shown below.

Concentration of sugar solution (%)	Diameter of cells in μm
1%	5.0
5%	4.0
10%	3.0
15%	2.0

- (a) From these results, determine the concentration of the cell sap. (1mk)
 (b) What term is given to the sugar solution whose concentration is equal to that of the cell sap? (1mk)
 (c) Give an explanation for the average diameter of the cells placed in 1% sugar solution compared to the normal diameter of the cells. (4mks)
- Describe the difference in appearance between cell cytoplasm before and after being placed in 15% sugar solution. (2mks)
3. The diagram below represents a section through the human eye.



- (a) Name the structures labelled A and B. (2mks)
 (b) State the functions of C and F. (2mks)
 (c) What changes occur in the structures labelled B and F if the eye changes from observing an object at a distance to one at close range? (2mks)
 (d) How structure D adapted to its functions. (2mks)

4. In a family with four children the father had blood group A while the mother had blood group B. One of the children had blood group O.
- (a) (i) What are the genotypes of the parents
 Mother (1/2mk)
 Father (1/2mk)
 (ii) What is the genotype of the child with blood group O? (1mk)
- (b) Work out the genotypes of the other children. (4mks)
- (c) What is the genotype of the child who can receive blood from all the other members of the family? (1mk)
- (d) State the percentage of children who can donate blood to all blood groups. (1mk)
5. *Ascaris Lumbricoides* is an endoparasite.
- (a) What is an endoparasite? (1mk)
- (b) Name the genus to which it belongs. (1mk)
- (c) State the habitat of the organism. (1mk)
- (d) State three ways in which the organism is adapted to living in its habitat. (3mks)
- (e) Mention two ways of preventing the spread of the parasite. (2mks)

SECTION B

Answer question 6 (compulsory). Attempt either question 7 or 8 in the spaces provided after question 8.

6. The glucose level in Mg per 100ml of blood of three people A, B and C who had been fasting for 12 hours was determined. The people were then fed on equal amounts of glucose and levels of glucose determined at 30 minutes intervals for 2 hours. The results were recorded in the table below.

TIME (MIN)	Blood glucose in Mg /100ml blood		
	A	B	C
0	94	158	90
30	146	184	119
60	225	194	125
90	140	189	115
120	120	180	85

- (a) On the same axis draw graphs of blood glucose level in the blood of A, B, and C against time (7mks)
- (b) If the normal glucose level in a healthy person is between 80 and 100 Mg of blood which one of the graphs you have drawn above represents the data for a person who is;
- (i) Healthy (2mks)
- (ii) Severely diabetic (2mks)
- (c) When was blood glucose level for person B and A equal. (1mk)
- (d) Account for the level of glucose in person C
- (i) During the first 30 minutes. (2mks)
- (ii) Between 60 and 120 minutes. (4mks)
- (e) Describe how a test to show that there is glucose in urine can be carried out in a school laboratory. (2mks)
7. Describe how the nitrogen in the air is made available to the plants and eventually to carnivores in an ecosystem. (20mks)
8. Describe how a bony fish is adapted for movement in its habitat. (20mks)