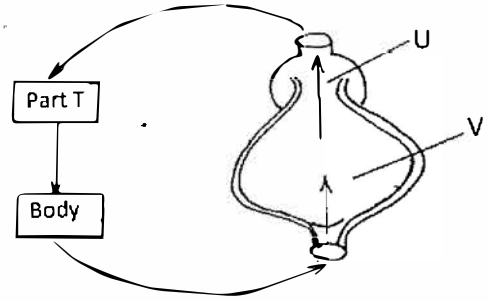
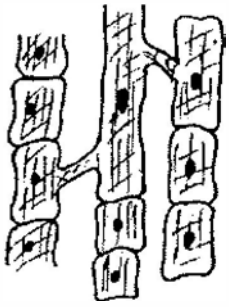
KISII CENTRAL SUB-COUNTY JOINT EVALUATION TEST
KENYA CERTIFICATE OF SECONDARY EDUCATION (K.C.S.E)

231/1
BIOLOGY
PAPER 1
TIME: 2 HRS
JULY/AUGUST 2016

1. a) What is cell specialisation? (1 mark)
   b) Name **two** specialised cells in plants. (2 marks)
2. Explain what happens to glucose formed by dicotyledonous leaf during photosynthesis. (3 marks)
3. State **three** features in bisexual flower that hinder self-fertilization. (3 marks)
4. Give reasons why primary productivity in an aquatic ecosystem decreases with depth. (2 marks)
5. State **two** advantages of metamorphosis to the life of insects. (3 marks)
6. The diagram below shows circulation in fish.

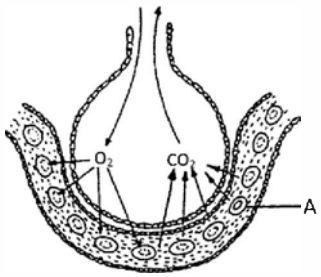


   i) Identify the type of circulation. ..... (1 mark)
   ii) Name the parts labelled **T** and **V**. (2 marks)
   iii) State **one** disadvantage of this type of circulation. (1 mark)
7. State how the following parts of the eye are suited to their functions.
   i) Cornea (2 marks)
   ii) Aqueous humour (2 marks)
8. The genetic disorder haemophilia is due to a recessive sex linked gene. A man who is haemophilia married a woman who is a carrier for the condition.
   a) Using the letter (H) to represent the normal condition an (h) for the haemophiliac condition.
   i) What is the genotype of the man and woman? (1 mark)
   ii) Work out a cross between the man and woman. (3 marks)
9. The diagram below represents a tissue obtained from an animal.



   a) Identify the tissue ..... (1 mark)
   b) State the function of the tissue named in (a) above. (1 mark)
10. Explain how hairs in mammals help in keeping the body warm. (3 marks)
11. In a laboratory experiment, a student observing a drop of pond water under a microscope saw and drew amoeba. The eyepiece magnification was X5 and the objective lens magnification X100.
    a) What was the magnification of the set up? (1 mark)
    b) If the amoeba had a diameter of 5cm at the above magnification. Calculate its actual length in micrometres. (2 marks)

12. The diagram **below** shows the exchange of gases in alveolus.



a) State how the alveoli are adapted to their function. (3 marks)
b) Name the cell labelled A. ..... (1 mark)

13. State **three** characteristics of merismatic cells. (3marks)

14. a) Name **two** chemical substances that form the DNA. (2 marks)
b) Write the base sequence of messenger RNA (mRNA) that would be coded from the DNA strand shown below. (1 mark)
C - A - T - G - A- G - T
c) What is a mutation? (1 mark)

15. State **three** adaptations of the Red blood cells. (3 marks)

16. a) State **two** functions of the xylem vessels. (2 marks)
b) List **two** structural adaptations that make xylem vessels suitable to their function. (2 marks)

17. Explain the following observations;
i) Some tropic plants are known to close their stomata during the day and open them at night. (2 marks)
ii) When transplanting a young plant it is advisable to remove some of the leaves. (2 marks)

18. a) Name the chemical compound formed in the mitochondria which is the source of energy. (1 mark)
b) Explain why fats are not considered as the main respiratory substrate yet they yield more energy when completely oxidised than carbohydrates. (2 marks)

19. a) State **one** function of thyroxin in mammals. (1 mark)
b) State **one** difference between nervous and endocrine system based on the nature of response. (1 mark)

20. A student failed to see the field of view through the eye piece of the microscope. suggest two possible reasons for this. (2 marks)

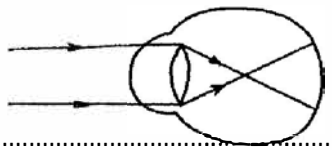
21. Explain what would happen to red blood cells if plasma glucose concentration becomes very high because insulin secretion failed. (3 marks)

22. State **two** disadvantages of anaerobic respiration in animals. (2 marks)

23. a) Name the spore producing structures in;
i) Bryophyta ..... (1 mark)
ii) Pteridophyta ..... (1 mark)

24. i) Differentiate the following convergent and divergent evolution. (2 marks)
ii) State **one** role played by Mutation in evolution. (1 mark)

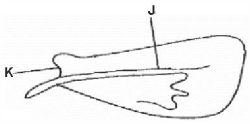
25. The diagram shows the position of a formed in a defective eye.



a) Identify the defect ..... (1 mark)
b) How can the defect be corrected? (1 mark)

26. The wings of birds and those of insects are superficially similar but their internal structure is completely different.
i) Name the type of evolution that led to the **two** types of wings. (1 mark)
ii) Give **two** other examples of this type of evolution. (2 marks)

27. The diagram below represents a bone obtained from a mammal.



a) Name the bone ..... (1 mark)
b) Name the:
i) Bone which articulates with the bone named in (a) above at the cavity labelled **K**. (1 mark)
ii) Joint formed by the bones (1 mark)

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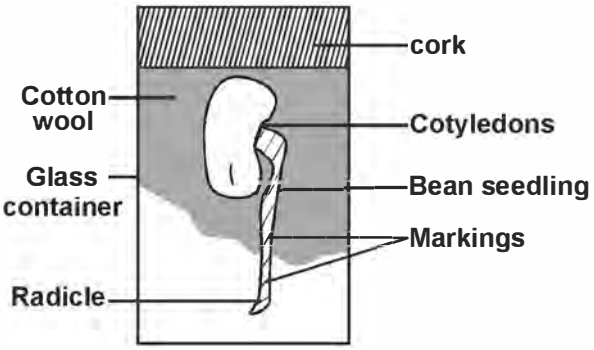
231/2
BIOLOGY
PAPER 2
TIME: 2 HRS
JULY/AUGUST 2016

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

1. A student set up an experiment as shown in the diagram below.

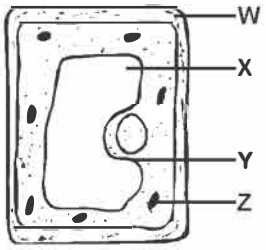


a) What was being investigated in the experiment? (1 mark)
b) On the diagram below indicate the expected results after three days. (2 marks)

c) Why was it necessary to have wet cotton wool in the container? (1 mark)
d) What is the role of each of the following to a germinating seed?
i) Oxygen (2 marks)
ii) Cotyledons (1 mark)
e) Small seeds require light immediately after germination. Explain. (1 mark)

2. Broad and thin humans are characteristics that are inherited. When a homozygous broad lipped is crossed with a homozygous broad lipped woman, all the children in the family are broad lipped. In a particular family, a woman that is heterozygous for broad lips is married to a man whose parents were both thin lipped, using letter **B** to represent genes for lips.
a) Work out the genotypic ratio of the children in that family. (6 marks)
b) What is the phenotypic ratio of the children in (a) above. (1 mark)
c) Difference between gene mapping and sequencing of gene. (1 mark)

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



a) Name the parts labelled **X, Y** and **Z**. (3 marks)
b) State the substance by which the part labelled **W** is made up of. (1 mark)
c) Name the process by which mineral salts move into the structure labelled **X**. (1 mark)
d) Explain what happens to a red blood cell when placed in distilled water. (3 marks)

4. 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 (PERCENT)	DIAMETER CELLS mM
1%	5.0
5%	4.0
10%	3.0
15%	2.0

a) From these results, determine the concentration of the cell sap. (1 mark)
b) What term is given to the sugar solution whose concentration is equal to that of the sap? (1 mark)
c) 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)
d) Describe the difference in appearance between cell cytoplasm before and after being placed in 15% sugar solution.

5. In an investigation, two persons **A** and **B** drank the same amount of a strong solution of glucose. Their blood sugar levels were immediately determined and thereafter at one hour intervals for the next six hours. The results were as shown in the table below.

Time in hours	**Glucose level in mg/100ml of blood**	
	Person A	Person B
0	86	110
1	225	355
2	160	320
3	92	300
4	90	260
5	90	245
6	86	215

a) In humans, the normal blood sugar level is about 90mg/100ml of blood. Explain the change in the sugar level in person **A** during;
i) The first 4 hours. (3 marks)
ii) The 6th hour (2 marks)
b) i) Suggest a possible reason for the high blood sugar levels in person **B**. (2 marks)
ii) How can high blood sugar level in a person be controlled? (1 mark)

SECTION B (40 MARKS)

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

6. During an ecological study of a lake, a group of students recorded the following observations.
Planktonic crustaceans feed on planktonic algae
Small fish feed on planktonic crustaceans, worms and insect larvae
Worms feed on insect larvae
A bird species feeds on small fish, planktonic crustaceans and worms
Insect larvae feed on planktonic algae
Large fish feed on small fish
a) From this record of observations, construct a food web. (5 marks)
b) From the food web you have constructed in (a) above, isolate and write down a food chain that ends with;
i) Bird species as secondary consumer (1 mark)
ii) Large fish as tertiary consumer (1 mark)
c) The biomass of the producers in the lake was found to be greater than that of primary consumers. Give an explanation for this observation. (1 mark)
d) Using either the observations recorded by the students or the food web you have constructed, name;
i) Two organism that complete for food in the lake. (2 marks)
ii) **Two** sources of food the organisms in (d) (i) above compete for. (1 mark)
e) i) State **three** ways in which humans may interfere with this lake ecosystem. (3 marks)
ii) Explain how each of the ways you have stated above may affect life in the lake. (6 marks)

7. a) Define the term tropism. (2 marks)
b) Explain the mechanisms of various tropisms in plants. (18 marks)

8. Describe how the various structures of the human female reproductive system are adapted to their function. (20 marks)

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231/3
BIOLOGY
PAPER 3
TIME: 2 HRS
JULY/AUGUST 2016

CONFINDENTIAL
Each candidate will require:
1. Test tube rack
2. Test tube holder
3. Mortar and pestle (can be shared)
4. 4**ml** of 1% Copper (II) sulphate solution
5. 4**mls** 10% sodium Hydroxide solution
6. Means of heating / Source of heat
7. Clean boiling tube
8. 10 **ml** measuring cylinder
9. Specimen **P**(10 pieces of dry Dagaa in a petridish)
10. Distilled water in a wash bottle
11. Empty beaker (100ml)
12. Four clean test-tubes
13. 3 **ml** of iodine solution
14. 4ml of Benedict's solution
15. Four droppers.

1. You are provided with specimen labeled P in a Petri dish. Examine the specimen.
a) i) Using observable features only, state class to which the specimen belong. (1 mark)
ii) Give two reasons for your answer. (2 marks)
b) Select five pieces of specimen P. Crush them in a mortar and pestle to obtain a powder. Place the crushed powder in a boiling tube. Add a small amount of distilled water and shake to mix. Decant the contents into a clean test tube.
i) Using the reagents provided, test for the food substances in the decant. Record down your procedure, observations and conclusions in the table below. (9 marks)

Food substance	Procedure	Observation	Conclusion

ii) What causes the following deficiency disease?
Beriberi (1 mark)
Pellagra (1 mark)
Pernicious anaemia (1 mark)

2. The diagram below represents a cross section of a plant stem. Study it and carefully answer the questions that follow.
a) Identify the letter that represents tissues responsible for support and name the tissues. (4 marks)
State two ways in which the tissues named in (a) above offer support. (2 marks)
b) i) When iodine solution was added to part R of the section, part R stained blue black. What does this indicate about this part? (1 mark)
ii) Tissue R is also present in the roots of plants. What is the function of this tissue in roots? (1 mark)
c) i) If the plant from which this section was obtained had first been placed in water containing eosin dye, which part would you expect to be stained with eosin dye? (1 mark)
ii) Name three forces which help water containing eosin to pass through the dyed tissues. (3 marks)
d) i) Name tissue Q. .....(1 mark)
ii) What is the name of the cell S seen adjacent to tissue Q? (1 mark)
iii) What is the function of this cell? (1 mark)

3. The photograph labelled **J**, **K** and **L** are all related to a mammalian kidney.
a) Name the hormone produced by the structure labelled **P**. (1 mark)
b) Name the parts labelled Q, R and T. (3 marks)
c) State the process by which wastes are filtered from blood in the structure labelled S. (1 mark)
d) i) Give two components of blood that are not filtered at S. (2 marks)
ii) Give two reasons why the components you have named in (d) i) above are not filtered. (1 mark)
f) What two adaptations would be expected in the structure L in a desert animal like a Camel? (2 marks)