

NAME \_\_\_\_\_ INDEX NO. \_\_\_\_\_

DATE \_\_\_\_\_

**231/1**  
**BIOLOGY**  
**PAPER 1**  
**(THEORY)**  
**JULY/AUGUST 2011**  
**2 HOURS**

**KANGUNDO DISTRICT FORM 4 MULTILATERAL EXAM**  
**Kenya Certificate of Secondary Education**  
**BIOLOGY**  
**PAPER 1**  
**THEORY**  
**2 HOURS**

**INSTRUCTIONS TO CANDIDATES**

- (a) Answer all questions in this paper in the space provided
- (b) Ensure you have ALL the questions indicated

For Examiners use only

Number of questions	Max score	Candidates score
28	80	

**This paper consists of 11 printed pages**

**Turn Over**

1. State the role of the following in the collection of biological specimens. (2mks)

(i) Pitfall trap

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(ii) Pooter

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2. Three members of the dog family, canidae are found in a national park. They are the wild dog (*Lycaon pictus*) the common jackal (*Canis aureus*) and the side striped jackal (*Canis adustus*).

(a) Which of these animals are more closely related? (1mk)

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(b) Give a reason for your answer in (a) above (1mk)

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3. (a) Differentiate between prokaryotic and eukaryotic cells. (1mk)

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(b) The diagram below represents a cell.  
A B Chloroplasts.

(i) Name the tissue from which the cell was obtained. (1mk)

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(ii) Name the parts labelled A and B (2mks)

A \_\_\_\_\_

B \_\_\_\_\_

4. Name the end – products of the light stage of photosynthesis. (2mks)

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5. Below is a diagram of a cell organelle.

A B

(a) Identify the organelle. (1mk)

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(b) Name the organic compound found in part labelled A. (1mk)

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(c) A certain metabolic process takes place in part labelled B. Name the process and the products formed. (2mks)

(i) Process

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(ii) Product (s)

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6. The table below shows the concentration ratio of some ions in pond water and in cell sap of an aquatic plant growing in the pond.

Ions	Concentration in pond water	Concentration in cell sap
Sodium	50	30
Potassium	2	150
Calcium	1.5	1
Chloride	180	200

- (i) Name the process by which the following ions could have been taken up by this plant.

(a) Sodium ion

(1mk)

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(b) Potassium ion

(1mk)

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- (ii) For each of the process named in (i) a and b above, state one condition necessary for the process to occur.

(2mks)

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7. Give two factors that determine the amount of energy that a human being requires in a day. (2mks)

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8. An organism was found to possess the following features; An exoskeleton, two pairs of antennae, bilateral symmetry, and jointed appendages.

Giving a reason in each case, state the phylum and class in which the organism belongs. (4mks)

Phylum \_\_\_\_\_

Reason \_\_\_\_\_

Class \_\_\_\_\_

Reason \_\_\_\_\_

9. State two adaptations of xylem vessels. (2mks)

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10. (a) Name the antigens that determine human blood groups. (2mks)

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(b) State the adaptation that enables the red blood cells to move into blood capillaries. (1mk)

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11. State two advantages of breathing through the nose than through mouth. (2mks)

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12. State two adaptive features which the buccal cavity of a frog has in common with the alveoli of the lungs of a human being. (2mks)

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13. List two uses of energy obtained from the process of respiration. (2mks)

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14. (a) Name the products of anaerobic respiration in  
(i) Plants (1mk)
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- 
- (ii) Animals.
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- (b) What is oxygen debt? (1mk)
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15. Explain what happens in humans when the concentration of glucose in the blood decreases below the normal level. (3mks)
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16. Form three students collected the following information during an ecological study of a lake.
- Planktonic crustaceans feed on planktonic algae.
  - Small fish feed on planktonic crustaceans, worms and insect larvae.
  - Worms feed on insect larvae.
  - A bird species feed on small fish, planktonic crustaceans, and worms.
  - Insect larvae feed on planktonic algae.
  - Large fish feed on small fish.
- (a) From the relationship stated above, isolate and write down a food chain that ends with bird species as secondary consumers. (1mk)
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- (b) The biomass of the primary producers in the lake was found to be greater than that of primary consumers. Give an explanation for this observation. (1mk)
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(c) Using the information provided, name:

(i) Two organisms that compete for food in the lake.

(1mk)

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(ii) The food the organisms compete for:

(1mk)

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17. State two disadvantages of sexual reproduction in animals.

(2mks)

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18. (a) Name two areas in a plant where meristematic tissues are found.

(2mks)

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(b) State two characteristics of meristematic cells.

(2mks)

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19. (a) Define seed dormancy.

(1mk)

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(b) The diagram below represents a stage during germination of a seed.  
Ground level

(i) Identify the type of germination illustrated in the diagram. (1mk)

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(ii) Explain how the type of germination named in b (i) above takes place. (2mks)

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

Q

a (i) Identify the stage of cell division (1mk)

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(ii) Give two reasons for your answer in a (i) above. (2mks)

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b Name the structure labelled Q (1mk)

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21. The table below illustrates a chromosomal mutation

Normal	E	F	G	H	I	J	K
Mutation	E	F	I	H	G	J	K

(a) Identify the type of mutation illustrated. (1mk)

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(b) State one cause of mutation. (1mk)

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22. 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 were the genotypes of the parents. (1mk)

Mother \_\_\_\_\_

Father \_\_\_\_\_

(b) Which child can receive blood from any member of the family? (1mk)

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(c) State the percentage of children who can donate blood to all other members of that family. (1mk)

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23. Tropism is a growth movement shown by a part of a plant towards or away from the stimulus. For each of the following responses, identify the type of tropisms described.

(i) Pollen tube growing towards ovules. (1mk)

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(ii) A seedling grown in a darkroom growing towards the window. (1mk)

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24. (a) Where in the human body are relay neurons found? (1mk)  
(b) The diagram below represent a neurone.  
P Q myelin sheath muscle fibres

(i) Name the neurone (1mk)

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(ii) Name the parts labelled P and Q. (2mks)

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25. Students from Mwingi studied a woodland ecosystem over a period of two years and noted the following. At the start of the study, the woodland was inhabited by owls and many moths some speckled and other black. After two years, students observed that there were many black moths than the speckled moths. Explain this observation. (2mks)

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26. Two green leaf samples X and Y were immersed in a beaker of warm water. The beaker was placed in sunlight. After sometime, bubbles of gas formed on the surface of leaves. In leaf x bubbles formed only on the upper surface while on leaf Y, more bubbles formed on the lower surface than on the upper surface.
- (a) Suggest why bubbles of gas form on the leaf surface. (1mk)

(b) What does the difference in the number of the bubbles between the two surfaces of Y indicate? (1mk)

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(c) From the observation on the difference in abundance of bubbles formed on the surfaces of the two leaf samples, suggest the natural habitats from which the leaves were obtained. (2mks)

X \_\_\_\_\_

Y \_\_\_\_\_

27. (a) Name one tissues in plants which are thickened with lignin. (1mk)

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(b) How is support attained in herbaceous plants. (1mk)

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28. Give the scientific name of the organisms that cause the following diseases in humans.

(i) Tuberculosis (1mk)

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(ii) Cholera (1mk)

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**231/1**  
**BIOLOGY**  
**PAPER 1**  
**(THEORY)**  
**JULY/AUGUST 2011**

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**BIOLOGY**  
**PAPER 1**  
**THEORY**  
**MARKING SCHEME**

1. (i) For catching crawling animals;  
(ii) For sucking small animals; (from rock surface or bark of trees)
2. (a) Common jackal/*Canis aureus* and the side striped jackal/*Canis adjustus*;  
(b) (They) belong to the same genus;
3. (a) Prokaryotic cells lack nuclear membrane while eukaryotic cells have nuclear membrane;  
(b) (i) Photosynthetic tissue; acc palisade mesophyll  
(ii) A – Nucleus;  
B – Sap vacuole/vacuole; acc cell vacuole  
Rej sap alone
4. - Hydrogen; acc hydrogen ions, hydrogen atoms;  
- Oxygen; acc oxygen gas Rej oxygen atoms/rej oxygen ions;  
- ATP/Energy;
5. (a) Chloroplast;  
(b) Chlorophyll;  
(c) Process – dark stage/dark reaction/carbon (iv) oxide fixation;  
Product – starch/glucose/lipids/proteins;
6. (i)(a) Diffusion;  
(b) Active transport;  
(ii) For: (ia) (there should be a) concentration gradient;  
(ib) (there should be) energy/carrier molecules;
7. Basal metabolic rate (BMR); Sex; Age; Body Size; occupation/activity'  
Acc B.M.R (first 2 @ 1mk = 2mks)
8. Phylum – Arthropoda; Rej wrong spelling  
Reason – Jointed appendages/presence of exoskeleton;  
Class – Crustacea; Rej wrong spelling  
Reason – two pairs of antennae;

**This paper consists of 4 printed pages**

**Turn over**

9. - Narrow to increase capillarity;  
 - Hollow to maintain continuous column of water;  
 - Lignified to prevent them from collapsing;  
 - Has pits/pores to allow lateral movement of water;  
 (First 2 = 2mks)
10. (a) Antigen A; Antigen B; Rhesus factor/Rhesus antigen;  
 Acc Antigen O  
 (b) Pliable/flexible/able to change its shape;
11. (i) Air is cleaned (of dust, bacteria) by hair in nostril;  
 - Control amount of air taken in;  
 - Warm air;  
 - Detect smell of air;  
 First 2 = 2mks
12. - (Both are) highly vascularised/supplied with a lot of blood capillaries to increase the rate of transportation of respiratory gases;  
 - (Both have) thin membrane for efficient/rapid/faster diffusion of gases;  
 - (Both are) lined with a thin film of moisture for gases to diffuse in solution form/moist to dissolve gases;  
 First 2 = 2mks
13. Energy for growth; locomotion; maintain body temperature; transmission of nerve impulses; stored in form of ATP;  
 first two = 2mks
14. (a) (i) Ethyl alcohol/Ethanol; carbon (iv) oxide  
 Energy / 210KJ/2ATP; REJ Alcohol alone  
 REJ Heat only rej ATP alone;  
 (ii) Lactic acid; Energy/ 150KJ/2ATP;
- (b) The amount of oxygen required to convert accumulated lactic acid to water, carbon (iv) oxide and Energy/ amount of oxygen required to convert accumulated lactic acid when supply is less than demand;
15. Pancrease releases glucagon; hence glycogen converted to glucose; fat is converted to glucose; reduced rate of respiration;  
 4 points max 3mks
16. (a) Planktonic algae → planktonic crustaceans → Birds;  
 (b) Producers provide a source of energy to support the consumers;  
 (c) (i) Planktonic crustaceans and insect larvae/ Bird species and small fish/small fish and worms;  
 (ii) Planktonic algae/planktonic crustaceans/insect larvae;
17. - Offspring can inherit undesirable characteristics from parents;  
 - Sexual reproduction takes along time;  
 - Depends on many processes such as pollination, fertilization, dispersal;  
 - Fewer offspring are produced;  
 - Involve two separate sexes; (which must mate)  
 (first two = 2mks)

18. (a) – Vascular cambium;  
 - Apical meristems;  
 - Cork cambium;  
 - Intercalary meristems;  
 (first two = 2mks)
- (b) Thin walls;  
 Dense cytoplasm;  
 Lack vacuoles;  
 (first two = 2mks)
19. (a) State at which a seed cannot germinate even when conditions for germination are suitable;  
 (b) (i) Epigeal; (germination)  
 (ii) Hypocotyl elongates faster; (so that the cotyledon are brought/pushed above the ground;
20. (a) (i) Anaphase 1/Anaphase of meiosis 1;  
 (ii) - Centromere of bivalent pair not split;  
 - Homologous chromosomes separate;  
 - (Homologous) chromosomes moving towards (opposite) poles of the cell;
- (b) Spindle fibres(s);
21. (a) Inversion;  
 (b) (Exposure to) gamma rays; chemicals like colchicine/mustard gas; ultra ; violent rays;  
 (first one = 1mk)
22. (a) (i) Mother – BO /  $1^B1^O$  and  $1^A1^O$   
 Father – AO; (two correct to score 1mk)  
 (Rej bo, ao)  
 (ii) OO; acc  $1^O1^O$
- (b) AB; acc  $1^A1^B$   
 (c)  $OO = \frac{1}{4} \times 100 = 25\%$ ;
23. (i) Chemotropism;  
 (ii) Phototropism;
24. (a) Brain/spinal cord/central nervous system; (Rej CNS)  
 (b) (i) Motor neurone; rej efferent neurone;  
 (ii) P – Dendrite;  
 Q – Axon;
25. Owl feeds at night/nocturnal and against the darkness; black moth is camouflaged; while speckled is exposed; hence predated upon, migrate reducing their numbers;  
 (3 points max 2mks)
26. (a) (Because of) gaseous exchange taking place through stomata found on the leaf surface;  
 (b) More stomata on the lower surface than on the upper surface;  
 (c) X – Aquatic/fresh water;  
 Y – Arid/semi arid areas;

27. (a) Sclerenchyma; Rej collenchyma/parenchyma;  
- Xylem vessels/ tracheids; (first 1 = 1mk)
- (b) Cells take in water and become turgid;  
Rej Turdigity alone.
28. (i) Mycobacterium tuberculosis;  
(ii) Vibrio cholerae;

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**231/2**  
**BIOLOGY**  
**PAPER 2**  
**(THEORY)**  
**JULY/AUGUST 2011**  
**2 HOURS**

**KANGUNDO DISTRICT FORM 4 MULTILATERAL EXAM**  
**Kenya Certificate of Secondary Education**  
**BIOLOGY**  
**PAPER 2**  
**THEORY**  
**2 HOURS**

**INSTRUCTIONS TO CANDIDATES**

- (a) This paper consists of Two sections; A and B.
- (b) Answer all the questions in section A in the spaces provided,
- (c) In section B answer question 6 (compulsory) and either question 7 or 8 in the spaces provided after question 8.

For Examiners use only

Section	Questions	Max score	Candidates score
A	1	8	
	2	8	
	3	8	
	4	8	
B	5	8	
	6	20	
	7	20	
	8	20	

**This paper consists of 9 printed pages**

**Turn Over**



**SECTION A (40 MARKS)**

1. The diagram below represents the pathway of water from soil into the plant.  
L K Film of water around soil particles Soil

(a) Name the structures labelled K and L. (2mks)

K \_\_\_\_\_

L \_\_\_\_\_

(b) Explain how water from the soil reaches the structure labelled L. (5mks)

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(c) Name the process by which mineral salts enter into the root hair cell. (1mk)

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2. Below is a diagram of an organelle that is involved in aerobic respiration.  
A B C

(a) Name the cell organelle. (1mk)

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

A \_\_\_\_\_

B \_\_\_\_\_

C \_\_\_\_\_

(c) What is the purpose of the folding of part labelled C. (1mk)

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(d) Give the chemical compound which stores the immediate energy produced in the cell. (1mk)

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(e) Give two reasons why accumulation of lactic acid during vigorous exercise lead to an increase in heart beat. (2mks)

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3. In a family with children, three were found to have normal skin pigmentation while one was an albino. Using letter A to represent gene for normal skin pigmentation and a to represent the gene for albinism.

(a) What are the possible genotypes of the parents. (1mk)

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(b) Work out the genotypic ratio of their children. (5mks)

(c) Apart from albinism, name two disorders that are genetically inherited in human beings.(2mks)

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4. The figure below shows a seedling which was placed in a horizontal position in the dark for four days.

(a) Name the hormone responsible for the response exhibited by the seedling. (1mk)

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(b) What is the name of the response exhibited by the roots of the seedling. (1mk)

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(c) Explain how this response occurs in the roots. (3mks)

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(d) Mutua saw a Lion as he walked along a forest path. His adrenal glands secreted hormone adrenaline to prepare him to run away. What were the effects of adrenaline in his circulatory system. (3mks)

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5. The diagram below shows an experiment used to investigate a certain process.  
Gas X Glass funnel Trough Water + sodium hydrogen carbonate Wooden stand Y

The set up was left in bright sunlight for four hours.

(a) State the aim of the experiment (1mk)

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(b) Name X and Y. (2mks)

X \_\_\_\_\_

Y \_\_\_\_\_

(c) Other than sunlight, name three other factors that would affect the experiment. (3mks)

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(d) State how the identity of gas X could be confirmed. (1mk)

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(e) Explain why only submerged plants were used in this experiment. (1mk)

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**SECTION B (40 MARKS)**

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

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

External temperature $^{\circ}\text{C}$	Urine $\text{cm}^3/\text{h}$	Sweat $\text{cm}^3/\text{h}$
0	100	5
5	90	6
10	80	10
15	70	20
20	60	30
25	50	60
30	40	120
35	30	150

(a) Plot the quantities of urine and sweat produced against the external temperature. (7mks)









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**BIOLOGY**  
**PAPER 2**  
**(THEORY)**  
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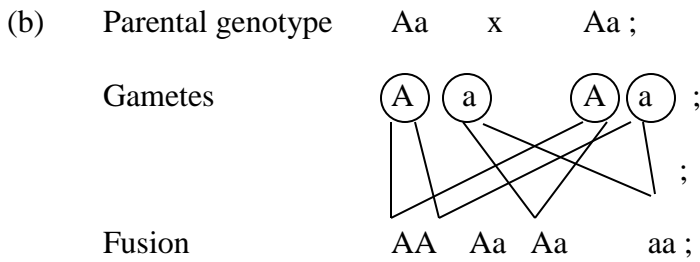
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**BIOLOGY**  
**PAPER 2**  
**THEORY**  
**MARKING SCHEME**

1. (a) K – Root hair cell;  
L – Xylem vessel; 2mks
- (b) Water moves from the soil into the root hair cell by osmosis; because concentration of cellsap is higher than water in the soil/a concentration gradient exists between the sap in the vacuoles of the root hair cell and the soil water; This exerts a greater higher osmotic pressure; thus drawing water molecules across the cell wall and cell membrane into the root hair cells; more water drawn into the root hair cells dilutes the cellsap making it less concentrated than that in the adjacent cortex cells of the root; thus water moves from cell to cell by osmosis; until it enters the xylem vessels/structure L;  
any 5 5mks
- (c) Active transport; Diffusion; 1mk
2. (a) Mitochondrion; 1mk
- (b) A = Outer membrane;  
B = Matrix;  
C = Cristae; 3mks
- (c) To increase/provide a large surface area for respiration/attachment of respiratory enzymes; 1mk
- (d) ATP/Adenosine Triphosphate; 1mk
- (e) Lactic acid is toxic/poisonous to tissues and must be removed from the muscles; To increase oxygen supply to the tissues to break lactic acid into water, CO<sub>2</sub> and energy; 2mks

**This paper consists of 5 printed page**

**Turn over**

3. (a) Aa; 1mk



Ratio 1AA : 2Aa : 1aa ; or AA : Aa : aa  
1; 2; 1,

(5mks)

- (c) (i) Sickle cell anaemia;  
(ii) Haemophilia;  
(iii) Colour blindness;  
(iv) Chondrodystrophic dwarfism/Achondroplasia;

Any 2

4. (a) Auxins;

1mk

(b) Geotropism;

1mk

(c) Gravity causes lateral migration of auxins to the lower side of the root;  
High concentration of auxins accumulates on the lower side of the root than on the upper side;  
Lower concentration of auxins stimulates/promotes faster root growth/High concentration of auxins inhibits growth in roots;  
Therefore the upper side of the root grows faster than the lower side; thus a growth curvature towards gravity/the root bends downwards;

3mks

(d) Heart beat increased; thus increasing cardiac output; Blood vessels dilate hence more blood flows to the tissues to deliver more oxygen and nutrients/remove metabolic waste products.

3mks

5. (a) To investigate the gas produced during photosynthesis/to show that oxygen is produced during photosynthesis; OWTTE 1mk

(b) X– Oxygen gas;

1mk

Y – Water weed/aquatic plant/pond weed/Elodea;

1mk

(c) Amount of carbon (iv) oxide; rej carbon dioxide  
- Temperature changes;  
- Amount of chlorophyll;  
- Size of plant;

Any 3 points 3mks

(d) It relights/rekindles a glowing splint;

1mk

(e) Water plant is able to use dissolved carbon (iv) oxide and carry out photosynthesis/can photosynthesize under low light intensities under water;

1mk

**SECTION B**

6. (a) Graph

7mks

Quantities of urine/sweat production ( $\text{cm}^3/\text{h}$ )    Sweat production    Urine production,  
External temperatures ( $^{\circ}\text{C}$ )    Y    X    0    10    20    30    40  
10    20    30    40    50    60    70    80    90    100    110    120    130    140    150

Axis = 2

Scale = 2

Identity = 1

Plotting = 1

Curve = 1

(b)  $24^{\circ}\text{C} \pm 0.5$ ;

1mk

(c) Sweat production increases; with increase in temperature because high temperatures increase the evaporation rate hence more sweat is converted to vapour;  
The latent heat of vapourisation from the body is used causing cooling;

3mks

(d) An increase in temperature decreases urine production;

This is due to increased sweating which raises osmotic pressure of blood;

A lot of water is then reabsorbed into the blood at the kidney tubules resulting in production of less concentrated urine;

3mks

(e) Hair – When hot erector pill muscles relax; hair lies flat reducing insulation and encouraging heat loss

When cold erector pill muscles contract; hair stands upright increasing insulation and discouraging heat loss.

Sweat glands – Releases sweat when it is hot' the sweat evaporates taking latent heat of vapourisation hence cooling the body;

When its cold there is less sweat production hence less evaporation.

Blood vessels – When hot they dilate (vasodilation); more blood flows to the skin surface increasing heat loss by radiation and convection; causing cooling of the body.

When cold they constrict (vasoconstriction; less blood flows to the surface;  
This reduces heat loss.

3 x 2 total 6mks

7. - Oxides of sulphur; are released during the manufacture of sulphuric acid causing acid rain/corrosion of metallic structures;
- Oxides of nitrogen, are released during the manufacture of nitric acid causing acid rain/corrosion of monuments/respiratory illness.
  - Motor vehicles exhaust fumes release carbon (II) oxide; which is a respiratory poison;
  - Combustion of petroleum fuels/coke/coal release carbon (IV) oxide; which creates global warming/green house effect;
  - Aerosols containing CFC in herbicides/perfumes/refrigerators/pesticides/air conditioners; cause depletion of ozone layer; hence causing skin cancer/eye diseases.
  - The aerosols also contain heavy metals; like copper and mercury that cause poisoning of plants and animals;
  - Smoke and fumes from industries; form smog which reduces visibility on roads/irritates the eye/blocks stomatal/;
  - Lead from combustion of leaded petroleum fuels; accumulates in vital organs thus poisons the body/block the stomata;
  - Defforestation exposes the top soil; to air currents/wind thus encouraging sheet erosion;
  - Loud noise from industries/ aeroplanes/Jua kali workshops; can lead to poor hearing ability;
  - Radioactive emissions; from nuclear reactors cause mutations/cancer/tumours; dust from industries/quarries/dusty dry weather roads; reduces visibility and irritates the eyes/clogs respiratory surfaces;

8. (a) (i) As members of a species continue to increase it leads to overcrowding; hence competition for species;

Organisms have to struggle to avoid predators or harsh environmental conditions;

2mks

(ii) Organisms with suitable variations in a population survives in a competition for resources;

Those with unsuitable variations die; suitable genes are passed on to offspring; unsuitable genes are eliminated from population

2mks

(b) Fossil records

Remains of dead organisms preserved naturally indicate that some organisms have evolved from simple life forms (oldest) to most complex (recent forms)

Comparative anatomy;

This involves comparing the form and structure of different organisms; Homologous structures suggest a common ancestry;

Geographical distribution;

This states that the land mass was one which later split to form present day continents organisms become isolated by physical barriers such as oceans, seas, lakes, hence underwent evolution.

Comparative embryology;

The embryo's of different organisms have been studied to find if they resemble. Embryo's of fish, birds, amphibians, reptiles and mammals resemble during early stages of development suggesting a common ancestry;

Cell biology;

Cells of higher organisms show basic similarities in their structures and functions suggesting a common ancestry.

Any 4 points x 4 ( total 16mks)

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**231/3**  
**BIOLOGY**  
**PAPER 3**  
**(PRACTICAL)**  
**JULY/AUGUST 2011**  
**1 ¾ HOURS**

**KANGUNDO DISTRICT FORM 4 MULTILATERAL EXAM**  
**Kenya Certificate of Secondary Education**  
**BIOLOGY**  
**PAPER 3**  
**PRACTICAL**  
**1 ¾ HOURS**

**INSTRUCTIONS TO CANDIDATES**

- (a) Write your official name and index number in the spaces provided above
- (b) Sign and write the date of examination in the spaces provided above
- (c) Answer ALL the questions in the spaces provided in the question paper
- (d) You are required to spend the first 15 minutes of the 1 ¾ hours allowed for this paper reading the whole paper carefully before commencing your work.
- (e) Additional pages must be inserted

For Examiners use only

Questions	Max score	Candidates score
1	13	
2	14	
3	13	
	40	

**This paper consists of 6 printed pages**

**Turn Over**

1. You have been issued with a solution labelled L1 Q and distilled water.

(a) Use iodine and benedicts solutions to test the types of food substances contained in solution labelled L1. Record the food substance being tested, procedures observation and conclusion in the table below. 4mks

Food substance	Procedure	Observation	Conclusion

(b) Label two test tubes T1 and T2. Then add 1ml of solution L1 to each test tube. In test tube labelled T1, add 1ml of solution Q and shake the mixture. Add 1ml of distilled water to test tube T2. Place the two test tubes in warm water bath whose temperature is maintained between 30<sup>0</sup>C to 35<sup>0</sup>C for 20 minutes.

Use benedicts solution to test the food substances contained in solution L1 in both test tubes at the end of the experiment. Record your observation and conclusion in the table of results below.

Test tube	Observation	Conclusion
T1		
T2		

(c) Account for your results at the end of the experiment in test tube T1 and T2.

(i) Test tube T1

2mks

(ii) Test tube T2

1mk

(c) (i) Suggest the identify of solution Q.

1mk

(ii) Give a reason for your answer in d (i) above.

1mk

(iii) Name a place in mammalian digestive system you will find the process being investigated in this experiment takes place.

1mk

(e) Why was test tube T2 included in this experiment?

1mk

2. The photomicrograph below represents a transverse section through a certain plant organ.  
P Q T Phloem U R



(a) (i) Name the plant organ in which the section was obtained. 1mk

(ii) Give a reason for your answer in a (i) above. 1mk

(b) (i) From your observation. Suggest the class of plant in which the section was got. 1mk

(ii) Give a reason for your answer in b (i) above. 1mk

(c) Name the parts labelled R and U. 2mks

R \_\_\_\_\_

U \_\_\_\_\_

(d) In the table below, state one function of the parts labeled Q, T and R. 3mks

Part	Function
R	
T	
Q	

(e) State two ways in which the structure labelled P is adapted to its function.

2mks

(f) (i) Measure the diameter of the micrograph along the line marked XY in mm

Diameter \_\_\_\_\_ mm

1mk

(ii) If the diameter of the section before magnification was 1500mm, calculate the magnification of the micrograph.

2mks

3. You have been provided with specimens labelled D1 and D2 which were obtained from the same animal. You also have dilute hydrochloric acid and boiling tube.

(a) Using observable features only, identify specimens D1 and D2. Give a reason for each case.

4mks

Specimen	Identity	Reason
D1		
D2		

(b) State two observable differences between specimen D1 and D2.

2mks

(c) State three ways in which specimen D2 is adapted to its function.

3mks

(d) Place specimen D1 in a test tube, then add 3ml of dilute hydrochloric acid.

Record your observations

(i) Observations

1mk

(ii) Account for your observations in d (i) above.

2mks

(iii) What is the effect of such a reaction as observed in d (i) above when it occurs naturally in human.

1mk

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**MARKING SCHEME**

1. (a)

Food substance	Procedure	Observation	Conclusion
Starch $\sqrt{1/2}$	Add (few drops) of iodine solution $\frac{1}{2}$ mk	Solution changes to blue/black/blue black $\frac{1}{2}$ mk	Presence of reducing sugars $\frac{1}{2}$ mk
Reducing sugar $\sqrt{1/2}$	To (1ml) of liquid L1, add (1ml) of benedicts solution. Then heat/warm/boil the mixture $\frac{1}{2}$ mk	No colour change turns blue $\frac{1}{2}$ mk	Absence of reducing sugars. $\frac{1}{2}$ mk

3mks

NB: Rej – spelling errors  
 - wrong sequence

Test tube	Observation	Conclusion
T1	The solution turns to green, yellow/orange/brown $\frac{1}{2}$ mk	Presence of reducing sugars $\frac{1}{2}$ mk
T2	The solution remains blue/no colour change $\frac{1}{2}$ mk	Absence of reducing sugars $\frac{1}{2}$ mk

2mks

(c) (i) Test tube T1

There was presence of reducing sugar; because enzyme/diastase hydrolysed starch into reducing sugars; 2mks

Test tube T2

There was absence of reducing sugars because there was no enzyme to break down starch into reducing sugar; Max 1

(c) (i) Enzyme/Diastase;

max 1

(ii) – It broke down starch into reducing sugars;

- Functions best in narrow temperange range;

Max 1

**This paper consists of 3 printed pages**

**Turn Over**

- (iii) – Mouth;  
- Deodenum;

(e) It was a control experiment;

Max 1

2. (a) (i) Root ;

- (ii) – Presence of root hairs;  
- Has endodermis;

max 1

(b)(i) Monocotyledonae✓1

- (ii) Vascular bundles for concentric/circular pattern;  
Xylem vessels alternate with phloem tissues;  
Vascular tissues surround a central piths;

Max 1

- (c) R – endodermis;  
U – Pith ;

2mks

(d)

Part	Function
R (endodermis)	Facilitates root pressure;
S (Phloem)	Translocation of soluble food substances;
T (Xylem)	Conducts movement of water and dissolved mineral salts;
Q (Cortex)	- Provides mechanical support; - Storage of food materials and starch;

Max 4

- (e) – Numerous to provide large surface are for absorption of water and dissolved mineral salts;  
- Thin walled to reduce distance of diffusion mineral ions/increase rate of diffusion of substances into the root;  
- Cytoplasm is more hypertonic than soil water to facilitate water absorption through osmosis;

Max 2

(f) (i) 78 mm  $\pm$  1;

max 1

(ii) Magnification =  $\frac{\text{linear length of photomicrograph}}{\text{Linear length of specimen}}$

$$1\mu\text{m} = \frac{1\text{ mm}}{1000} \text{ or } 1000\mu\text{m} = 1\text{mm}; (\frac{1}{2} \text{ mk})$$

$$1500\mu\text{m} = 1500 \times \frac{1}{1000} = 1.5\text{mm}; (\frac{1}{2} \text{ mk})$$

$$\text{Magnification} = \frac{78\text{mm}}{1.5\text{mm}} = \times 52 ; (\frac{1}{2} \text{ mk})$$

$$= \times 52; (\frac{1}{2} \text{ mk})$$

max 2mks

Or

$$\text{Magnification} = \frac{78000 \mu\text{m}}{1500 \mu\text{m}} = \times 52$$

$$1000 \mu\text{m} - 1\text{mm}; \left(\frac{1}{2} \text{mk}\right)$$

$$? \quad - 78$$

$$1000 \times 78 = 78000 \mu\text{m}; \left(\frac{1}{2} \text{mk}\right)$$

$$\text{Mg} = \frac{78000}{1500}; \left(\frac{1}{2} \text{mk}\right)$$

$$= \times 52; \left(\frac{1}{2} \text{mk}\right)$$

Max 2

3. (a)

Specimen	Identity	Reason
D1	Incisor tooth	- Wedge shape; - Has one root;
D2	Molar	- has cusps; - has 4/3 roots;

Max 2mks

(b)

D1	D2
- Has one root - Has no cusps /ridges at the cutting edges - Has narrow sharp cutting edge	- has $\frac{3}{4}$ roots; - has cusps/ridges at the cutting edges; - has a broad cutting edge;

Max 2

(c) – Has cusps/ridges at the cutting edge to increase the surface area over which food is crushed or Ground;

- Has a large working surface for efficiency;
- Has 3 or 4 roots for firm fixation/anchorage in the jaw;
- Have M-W shaped top surfaces this ensures proper grinding of food;

Max 2

(d) (i) Observation

Air bubbles are produced/fizzing occurs;

1mk

(ii) Hcl corrodes the specimen by reacting with calcium phosphate; in it to release the gas which form the air bubbles;

2mks

(iii) Causes tooth decay/dental carries;

1mk

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PAPER 3  
PRACTICAL  
CONFIDENTIAL**

**INSTRUCTION TO SCHOOL**

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 content. Great care must be taken to ensure that the information here in does not reach the candidate either directly or indirectly. The teacher in charge of Biology should NOT perform any of the experiment or give any information related to these instructions.

Each candidate will require the following items

10 ml of the following solutions in beakers;

0.5% starch solution labelled L1

10% enzyme diastase labelled solution Q

Distilled water

Benedicts solution

Iodine solution

2 labels

Source of heat

200ml warm water bath whose temperature is maintained between 30<sup>0</sup>C to 37<sup>0</sup>C in a 250ml beaker.

2 droppers

Transparent ruler with mm marks

4 test tubes

Incisor tooth labelled D1

Molar tooth labeled D2

10 ml dilute hydrochloric acid

NB:

D1 and D2 should be obtained from the same animal preferably a cow.

**This paper consists of 1 printed page**