

Name: Index No:

School: Date:

231/1

BIOLOGY

Paper 1

Time: 2 Hours

MACHAKOS COUNTY KCSE TRIAL & PRACTICE EXAMINATION 2015

Kenya Certificate of Secondary Education

BIOLOGY

Paper 1

Time: 2 Hours

INSTRUCTIONS TO CANDIDATES:

- Write **your name** , **Index Number** and **School** in the spaces provided above.
- Answer **all** the questions in this question paper.
- Answers **must** be written in the spaces provided in this booklet.
- All answers must be written in English
- This paper consists of 11 printed pages. Candidates should check to ascertain that all papers are printed as indicated and that no questions are missing

EXAMINER'S USE ONLY

Question	Maximum score	Candidate's score
1- 30	80	

1. What do the following branches of Biology entail? (2marks)

(a) Cytology

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(b) Entomology

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.....

2. State TWO characteristics of kingdom Monera that are not found in other kingdoms. (2marks).

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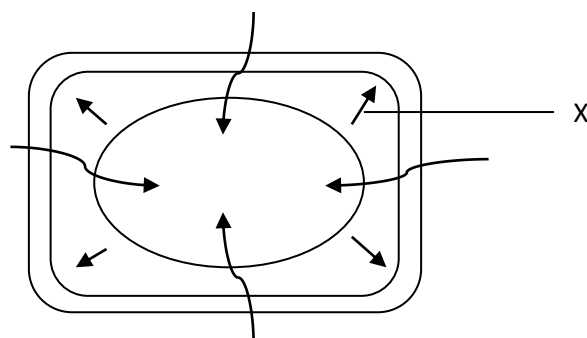
3. Two species in an ecosystem cannot occupy the same niche. Explain. (1 mark)

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4. State the significance of metamorphosis to the life of insects. (2 marks)

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5. The diagram below shows results of what happens to plant cell when placed in a certain solution.



a) What was the nature of the solution in which the cell was placed? (1 mark)

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b) Identify the force represented by the arrow X and explain how it develops.

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6. Which organelle would be numerous in the following cells; (2 marks)

a) Liver cell

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b) Palisade cell

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7. The scientific names of three animals leopard, wolf and lion in the family carnivora are; Panthera pardus, Canis lupus and Panthera leo respectively.

a) Why are scientific names given in Latin? (1 mark)

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b) What does *Canis* refer to? (1 mark)

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c) Giving a reason, state the organisms that are MOST closely related. (1 mark)

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8. The word equation below shows a biological process.



a) Name the process. (1 mark)

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b) Where does the process named in a) above take place? (1 mark)

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c) State two conditions necessary for the process to occur. (2 marks)

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9. a) What is the importance of heartbeat in blood circulation?

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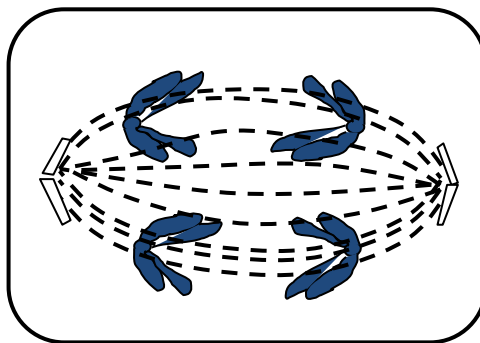
b) If the nerve supply to the heart of a mammal is severed, the rhythmic heart movement will still go on and the heart continues to beat. Explain this observation. (1 mark)

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10. The ovaries of an expectant woman can be removed after the first four months of pregnancy without terminating the pregnancy. Explain. (2 marks)

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



a) Name the stage of cell division. (1 mark)

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.....

b) Give two reasons for your answer in a) above. (2 marks)

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c) State the significance of this stage of cell division in living organisms. (1 mark)

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12.) Name the causative agent for the following diseases;

a) Typhoid

(1 mark)

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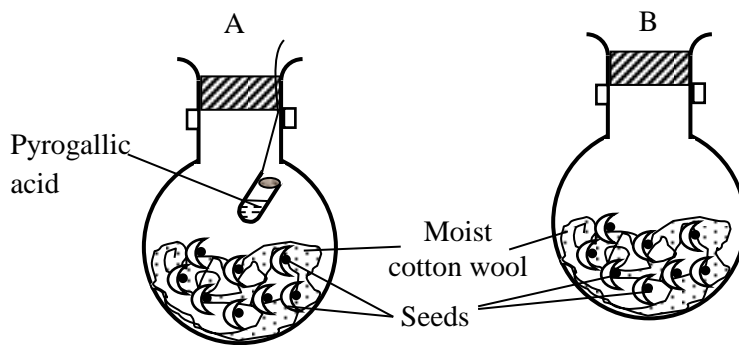
b) Syphilis

(1 mark)

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13. 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)

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b) State the expected observation at the end of the experiment.

(2 marks)

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c) Account for the observation made in set up A.

(1 mark)

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14. a) Name the respiratory surface for gaseous exchange in insects.

(1 mark)

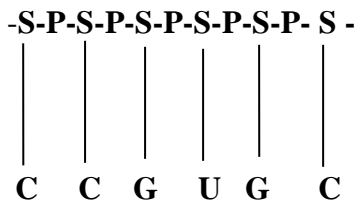
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b) State two adaptations of the site named in a) above.

.....

15. A portion of a nucleic acid is shown below;



a) Name the nucleic acid to which the portion belongs. Give a reason. (2 marks)

.....

b) Write down the sequence of bases of a complimentary strand to the one above. (1 mark)

.....

16. Explain the meaning of the following terms;

a) Basal Metabolic Rate (1 mark)

.....

b) Oxygen Debt (1 mark)

.....

17. In an experiment, the concentration of ions in the cell sap of reeds growing in a swampy area and the water in the swamp were determined. The data below was obtained. Study it and answer the questions that follow:

Sample	Na ⁺	Mg ²⁺	Cl ⁻	SO ₄ ²⁻
Cell sap	50	11	101	13
Swamp water	1.2	30	10.2	0.67

a) Name the process by which uptake of the following ions by the reeds occurs. (2 marks)

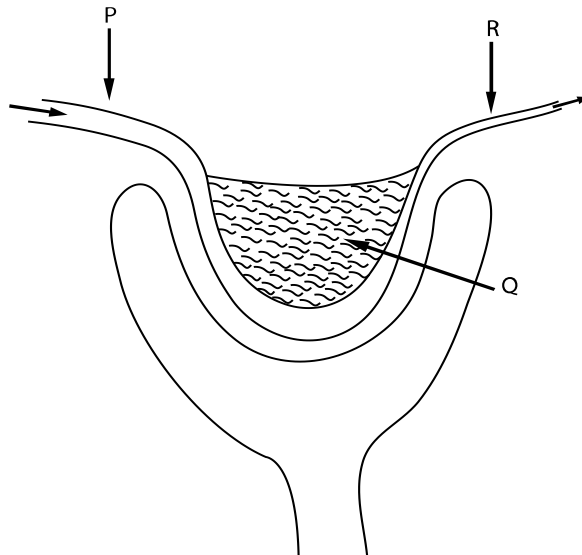
Na⁺ ions

Mg²⁺ ions

b) What effect would reduced oxygen supply have on the uptake of sulphate ions?
Explain your answer.

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18. The diagram below shows a part of a nephron.



a) State TWO differences in composition of blood in parts P and R. (2 marks)

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b) State a characteristic feature of blood capillaries in part Q that is not found in other capillaries (1 mark)

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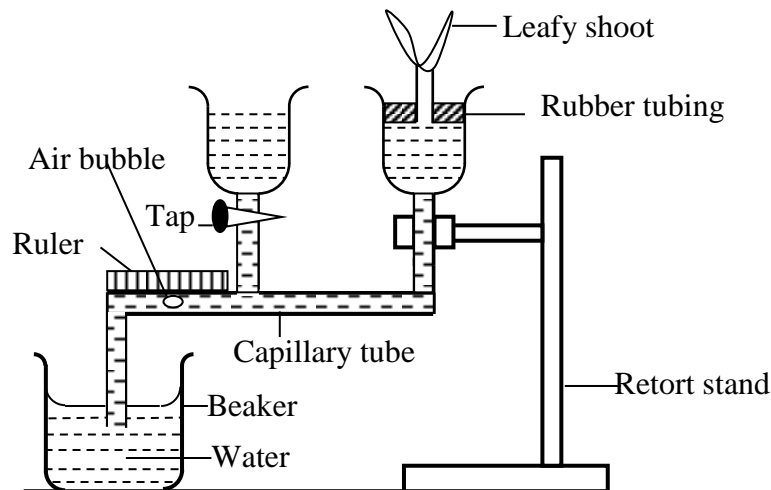
19. (a) Name two types of light sensitive cells found in the human eye. (1 mark)

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.....

(b) State ONE functional difference between the cells you have named in a) above. (1 mark)

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.....

20. A set up was used to investigate a certain process in plants as shown in the diagram below.



(a) What process was being investigated? (1 mark)

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(b) Giving a reason, state one precaution that should be taken when setting up this experiment. (1 mark)

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(c) How would changes in temperature affect the rate of movement of the air bubble? (1 mark)

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21. Julie observed eight onion epidermal cells across the field of view of a light microscope. If the field of view was 4mm in diameter, estimate the average size of the cells in micrometers (1mm= 1000µm). (2 marks)

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22. How is support brought about in herbaceous plants? (2 marks)

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23. State the functions of the following parts of the mammalian ear.

a) Eustachian tube (1mark)

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b) The utricle and sacculus (1mark)

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24. In an experiment, a shoot of maize seedling was exposed to light on one side. It was observed that it grew bending towards the direction of the source of light.

a) Explain how the bending towards light occurs. (2marks)

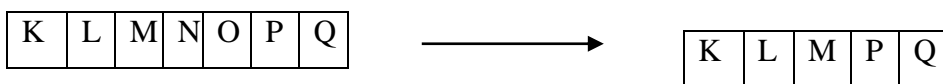
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b) State the survival value of the response named in a) above. (1 mark)

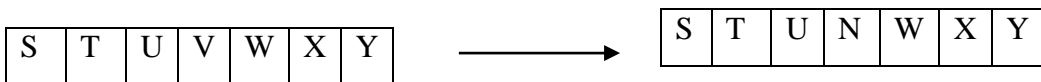
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25. The diagram below show various types of gene mutations.

Mutation I;



Mutation II;



i) Identify the type of mutations shown above (2 marks)

.....

ii) Name one disorder that results from gene mutation II. (1 mark)

.....

26. State THREE adaptations of a leaf to gaseous exchange.

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27. Distinguish between analogous structures and homologous structures. For each structure give an example. (4 marks)

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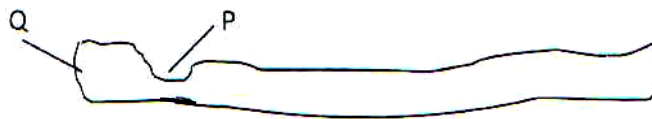
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28. The diagram below shows a bone that was obtained from a mammal.



a) Identify the bone. (1 mark)

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b) i) Name the type of joint formed at the part marked P. (1 mark)

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ii) State one characteristic of the joint named in b) i) above. (1 mark)

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29. What is the importance of the pollen tube in fertilization in plants? (1 marks)

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30. a) The action of pepsin stops in the duodenum. Explain.

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b) State two functions of the muscles found in the alimentary canal of mammals. (2 marks)

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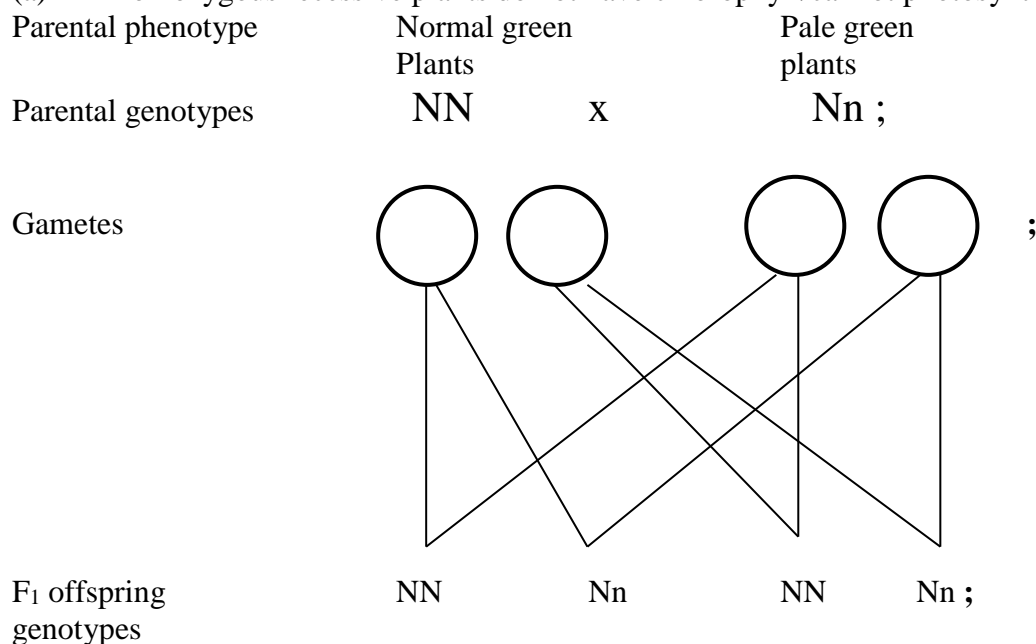
BIOLOGY

Paper 2

Time: 2 Hours

1. (a) (i) Ribosomes;
- (ii) Rough endoplasmic reticulum/ Rej. RER
Smooth endoplasmic reticulum; Rej. SER
- (iii) Lysosomes;
- (iv) Golgi apparatus/Golgi bodies;
- (b) Cell diameter = $\frac{\text{Diameter of field of view in } \mu\text{m}}{\text{Number of cells in field of view}}$
= $\frac{6000\mu\text{m}}{55}$; = 109 μm ;
- (c) - To avoid refraction of light;
- To prevent wetting of slide;
(Mark any one = 1 Mark)

2. (a) Homozygous recessive plants do not have chlorophyll/cannot photosynthesize;
- (b) Parental phenotype



Punnet's Square

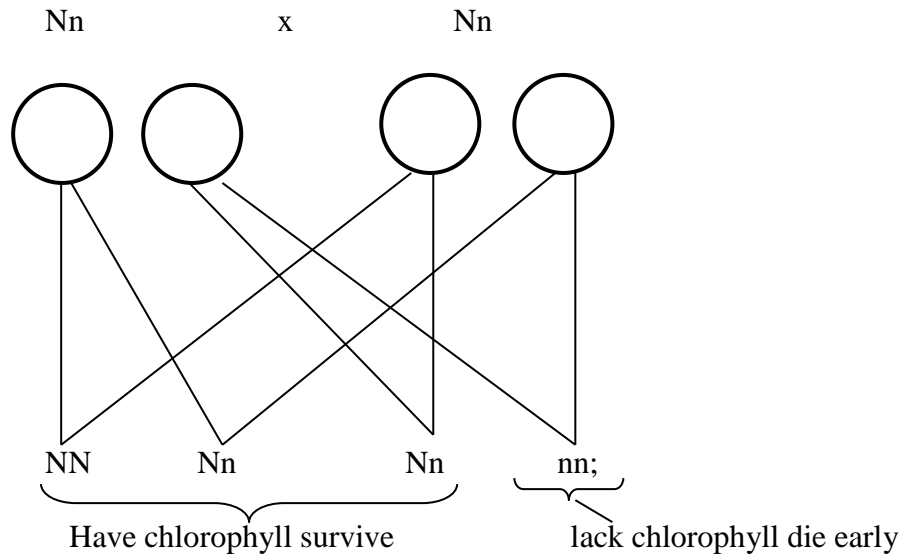
Parental genotype NN x Nn;

♀	♂	N	N;
N		NN	NN;
n		Nn	Nn

c) Parental genotype

Gametes

Offsprings



$$\frac{3}{4} \times 100 = 75\% ; \text{ Grow to maturity}$$

(d) Due to incomplete dominance of the gene for normal colour;

3. (a) Metaphase of meiosis I;
 (b) A = Cell membrane;
 B – Spindle fibre;
 C – Centriole;

(c)

Mitosis	Meiosis
(i) Occurs in all somatic cells	Occurs only in reproductive cells;
(ii) Occurs in one phase	Occurs in 2 phases;
(iii) Daughter cells produced are diploid	Daughter cells produced are haploid;
(iv) Homologous chromosomes do not come together/do not pair	Homologous chromosomes come together/pair;
(v) No variation at the end	Variation occurs at the end;

(Any first 3 @ 1 Mark = 3 Marks)

(d) Crossing over;

4. (a) ✓ The total area of habitats is measured and the area of study is marked.
1. Quadrant is thrown at random in the study area.
 2. The various plant species in the quadrants are identified and labelled.
 3. The number of each plant species is counted and recorded.
 4. Several throws are made in the study area at random and the process repeated several times. The average number of each plant species per quadrant is worked out.
 5. Calculation is made for the population for the total area of study.
- (6 x ½ = 3 Marks)

(b) (i) Population size (N) = $\frac{\text{No.of beetles in 1st catch} \times \text{No.of beetles in 2nd catch}}{\text{Beetles marked recaptured}}$
 = $\frac{400 \times 374}{80}$;
 = 1870 (beetles);

6. (a) (i) $\frac{15}{100} \times 100 = 15\%$

(b) (i) The allele O appears in many blood groups/Allele O appears in blood group A, B and O; therefore higher chances of being inherited in a population;

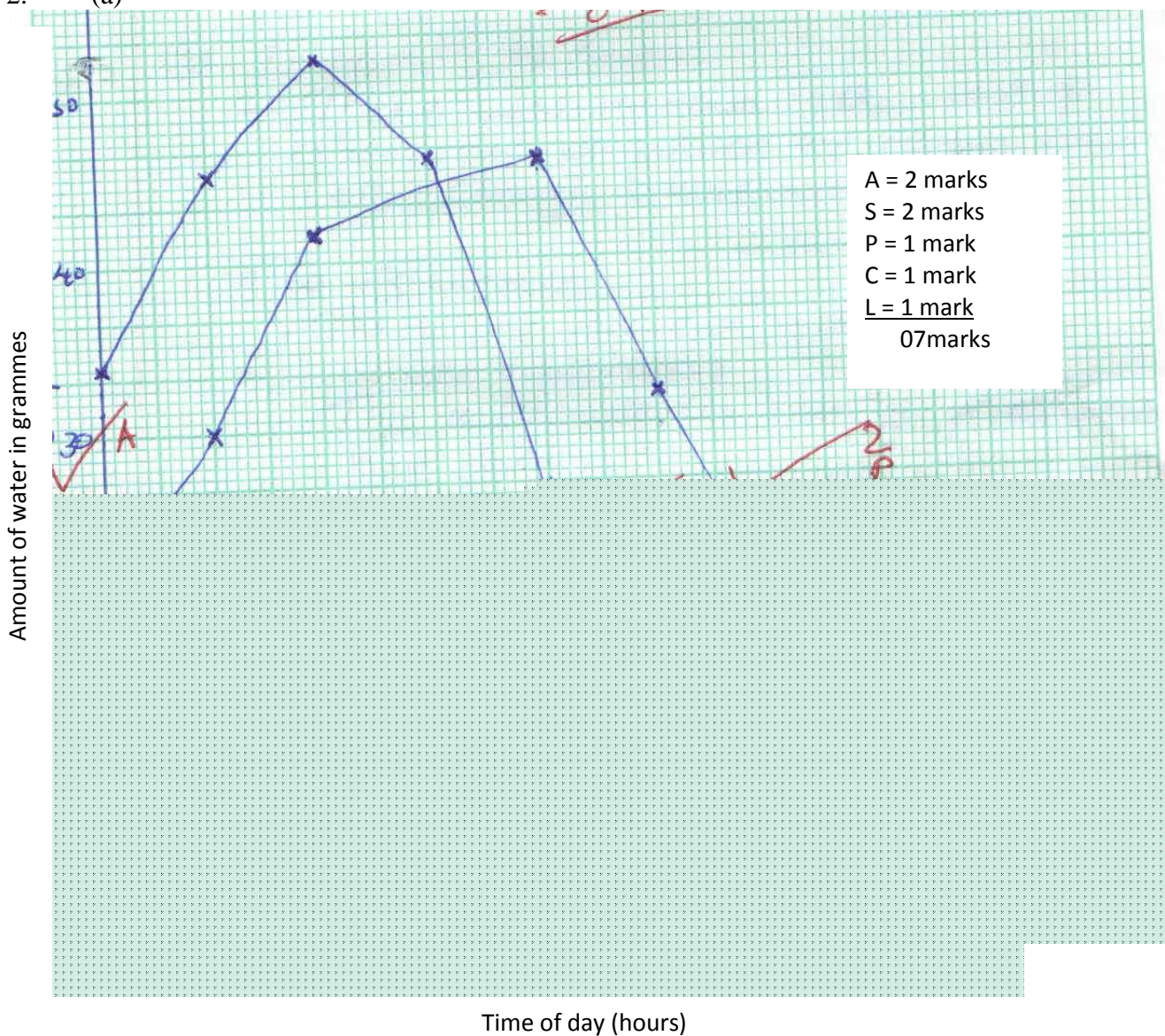
(ii) Allele A and B are co-dominant; hence express themselves only in blood group AB;

1. (i) To increase the surface area for efficient transport/increase efficiency of delivery of oxygen; (to tissue)

(ii) At high altitude air is less dense/partial pressure of oxygen is low/there is low concentration of oxygen, hence the number of red blood cells/structure C increases to increase oxygen carrying capacity of blood;

(iii) Phagocytosis;

2. (a)



(b) 17:00 – 19:00

(c) (i) 11:00 – 19:00 hours

- There was rapid increase in the rate of transpiration;
- This was due to high light intensity;
- Also due to high temperature;

(ii) 11:00 – 19:00 hours

- There was increase in the rate of absorption of water to replace water lost through transpiration;
- 19:00 – 3:00 hours

- There was decrease in the rate of water absorption.
- This is because the rate of transpiration had declined;

(d) Both transpiration and absorption would decline;

(e) - Wind;

- Humidity;
- Atmospheric pressure;
- Temperature;
- Light;

(Any 1st two = 2 Marks)

- (f) - Wind – The rate of transpiration is faster when it is windy and lower when air is still;
- Temperature – Rate of transpiration is high at high temperature and low at low temperature;
 - Humidity – When humidity is low, the rate of transpiration is faster while the rate of transpiration is low when humidity is high;
 - Atmospheric pressure – The rate of transpiration is high when atmospheric pressure is low while at high atmospheric pressure, the rate of transpiration is low;
 - Light intensity – It affects photosynthetic rate hence opening and closing of stomata that allows for water loss;

3. (i) Process of inhalation in mammals

1. External intercostals muscles contract; while internal intercostals muscles relax;
2. (This movement) pulls ribs upwards and outwards;
3. The diaphragm muscles contract; and the diaphragm flattens;
4. (All the above movements) increases the volume of thoracic cavity; and decreases its pressure; Atmospheric pressure being higher than thoracic cavity pressure; Forces the air to rush into the lungs; (through the nose and trachea)

1. The lungs are inflated. (Max. 10 Marks)

(ii) During the day, chloroplast of guard cells accumulate sugar/glucose produced through the process of photosynthesis;

1. Accumulated sugar/glucose in the guard cells increases osmotic pressure of the cell sap of the guard cells;
2. Water is drawn from the neighbouring epidermal cells by osmosis;
3. Guard cells become turgid and bulges outward;
4. This opens the stomata;
5. At night, sugar/glucose which had accumulated in guard cells is converted to starch;
6. Osmotic pressure of guard cells falls;
7. The cells lose water to the neighbouring epidermal cells and become flaccid;
8. The guard cells are drawn towards one another.
9. The stomata closes; (Max 10 Marks)

10. How is the human eye adapted to its functions. (20 Marks)

1. Conjunctiva – Thin/transparent/tough; allow light to pass through/protect the eye;
2. Sclerotic layer – Is made up of (collagen) fibres/fibrous; It maintains shape of eye (ball)/protect the eye.
3. Choroid – (Is a layer of tissue) with black/dark pigments; Prevents internal reflection of light in the eye; Contains blood vessels; that supply oxygen/nutrients/remove (metabolic) waste from the eye;
4. Cornea – Is transparent/curved; thus refracts light rays/allows light to pass through;
5. Retina – Has rods/cones for colour/bright light vision and rods for low light vision;
6. Fovea/Fovea centralis/yellow spot – has high concentration of cons for accurate vision/visual acuity;

7. Blind spot - Has no cones and rods; place where optic nerves leaves/enters the eye;
8. Optic nerve – Has sensory nerve fibres/neurons; for transmission of impulses to the brain (for interpretation);
9. Lens – Is biconvex/made of elastic/transparent material; adjust to focus for a near object/accommodation/allow light to pass through/for refraction of light rays;
10. Ciliary body – Is made up of muscle fibres/glandular; which contracts/relax; to change shape/curvature of lens/produces aqueous humour;
11. Suspensory ligaments – Are elastic; hold lens in position/attach it to ciliary body;
12. Iris – Has radial and circular muscles; which control the size of the pupil;
13. Pupil – Is the hole at the centre of iris; through which light passes into the eye;
14. Aqueous humour – Is a fluid/transparent/clear; through which oxygen/nutrients pass to cornea/lens/maintain shape of eye (ball) refracts light rays/allows light to pass through;
15. Vitreous humour – Is a fluid/transparent/clear; which maintain shape of eye/refracts light rays/allows light to pass through;

MACHAKOS COUNTY

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BIOLOGY

PAPER 3

(PRACTICAL)

1³/₄ HOURS

1. You are provided with specimen P. Make a longitudinal section.

- (a) (i) Draw and label one of the cut surface of the specimen. (4 Marks)
 (ii) Work out the magnification of your drawing. (1 Mark)

- (b) (i) What type of fruit is specimen P? (1 Mark)
 (ii) Give a reason for your answer. (1 Mark)

- (c) (i) Suggest the type of placentation found in specimen P. (1 Mark)
 (ii) Give one reason for your answer. (1 Mark)

- (d) (i) Name the mode of dispersal of the specimen. (1 Mark)
 (ii) State two ways in which specimen P is adapted to be dispersed by the mode named in (i) (4 marks)

2. You are provided with iodine solution, visking tubing, a beaker and a solution labelled X. Tie one end of the tubing provided with a thread tightly. Measure 5ml of solution X. Pour 5ml of solution X into the visking tubing. Tie the other end of the tubing tightly. Ensure there is no leakage. Rinse the outside of the tubing with distilled water and immerse it with its contents in a beaker containing iodine solution. Allow it to stand for 20 minutes.

- (a) (i) Record your observation at the beginning and end of the experiment. Record your results in the table below. (4 Marks)

Experimental set up	Solution x inside the tubing	Iodine solution outside the tubing
Beginning of experiment		
End of experiment		

- (ii) What was the identity of solution x. (1 Mark)
 (iii) Suggest the nature of visking tube. (1 Mark)
 (iv) Account for the results obtained in a (i) above. (4 Marks)

- b) (i) Which physiological process was being investigated in this experiment? (1 Mark)
 (ii) State two factors which affects the process being investigated (2 Marks)

3. You have been provided with photographs of specimens labelled Q1, Q2 and Q3. Examine them.

SEE PHOTOGRAPHS ATTACHED

a) By using observable features only, state the phylum and class to which the specimens belong. By using the three specimens, give reasons for each case.

(a) Phylum _____ (1 Mark)

Reasons (3 marks)

(i)

(ii)

(iii).....

(b) Class _____ (1 mark)

Reasons (3 marks)

(i)

(ii)

(iii).....

(c) Using observable features only, give three differences between specimen Q1 and Q3. (2 Marks)

(d) (i) Apart from locomotion, state the other role of the hind limbs of specimen Q1. (1 Mark)

(ii) How are the hind limbs of specimen Q1 adapted to perform role named in d (i) above. (2 Marks)

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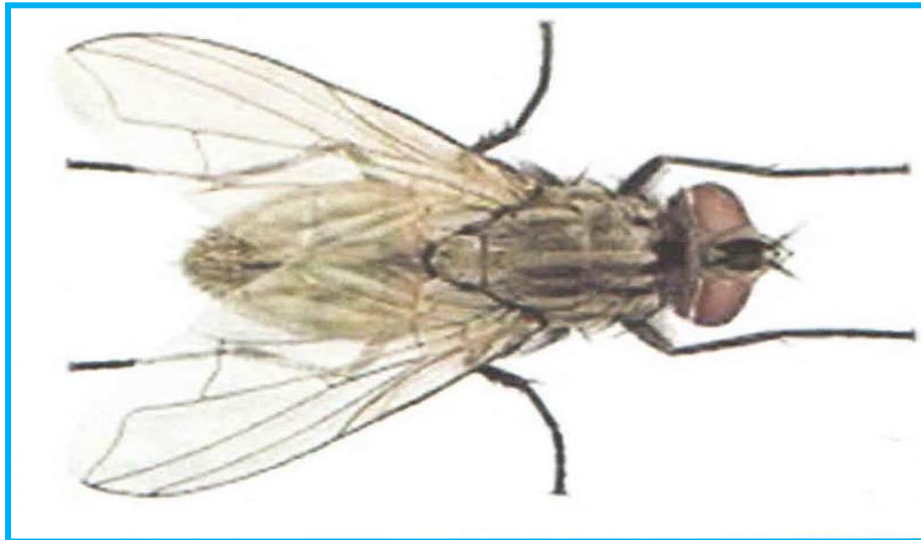
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**BIOLOGY-PAPER 3
(PRACTICAL)**

1³/₄ HOURS



Q1



Q2



Q3