KITUI COUNTY MOCK
END OF TERM II FORM FOUR EXAMINATION, 2017
Kenya Certificate of Secondary Education (K.C.S.E)
231/2
BIOLOGY
PAPER 2
MARKING SCHEME

SECTION A

1. a) Photosynthesis;
   b) - Presence of light intensity;
   - Presence of chlorophyll;
   - Availability of water;
   - Carbon (IV) oxide concentration;
   - Temperature;

   Mark first two points

   c) Oxygen - Used in respiration or oxidation of substances to yield energy;
   - Some oxygen is released into the atmosphere;

   Glucose - Used in respiration;
   - Some is converted to starch or sucrose for storage;
   - Is used in the formation of structures in plants e.g cellulose cell wall / cytoplasm;

   Amino acids - Used for growth and development;
   - Formation of various structures

   7 marks maximum 5
2. a) Root (1 mark)
   b) - Presence of endodermis;
   - Presence of hairs;
   - Xylem is star-shaped at the centre while phloem is in between the arms of the xylen;

   Mark first two points

   c) **J** – Epidermis; **K** – Phloem; **L** – Xylem; (3 marks)
   d) - Absorption of water;
   - Absorption of mineral salts;

   (2 marks)
3. a) Lack of organic food; because plants are white hence they lack chlorophyll; the plant cannot photosynthesize hence no starch is formed; the plant dies as soon as the food reserves are depleted;

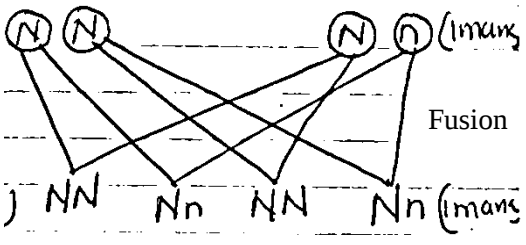
   (2 marks)

   b) Parental phenotype ♂ ♀

   Green plant Pale green plant (1 mark)

   Parental genotype NN × Nn (1 mark)

   Gametes

   F_1 generation (Genotype)

   Genotypic ration 2NN : 2Nn

   1NN : 1Nn

   Or

   Parental phenotype ♂ ♀

   Green plant Pale green plant

   Parental genotype NN × Nn

   Gametes

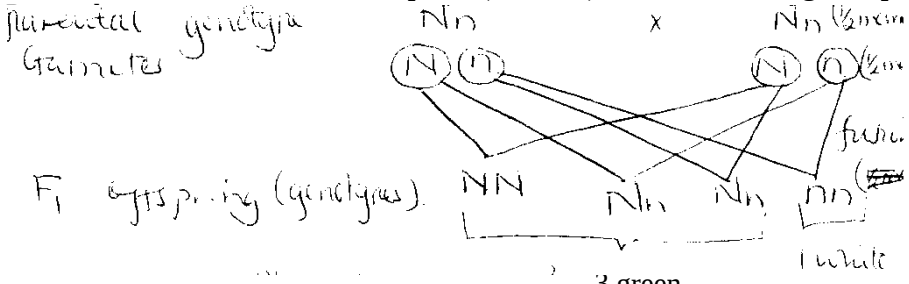
Gametes female ♀ / Gametes ♂	N	n
N	NN	Nn
N	NN	Nn

First filial generation genotypes

NB:
- Circles must be complete to score correctly
- Gametes must be circled;
- The lines should touch the circles during fusion

c) Parental phenotype ♂ ♀

Pale Green plant (½ mark) Pale green plant (½ mark)



3 green

Phenotypes 3 green
Proportion ¾ = 75% (½ mark)

Or

Parental phenotype ♂ ♀

Pale Green plant (½ mark) Pale green plant (½ mark)

Parental genotype Nn × Nn

Gametes (N) (n) (N) (n)

Gametes ♀ / Gametes ♂	N	n
N	NN	Nn
n	Nn	nn

F1 offspring genotypes

Proportion = ¾ or 75%

4. a) Biological control is using a living organism to regulate or control or reduce the population of another organism; (1 mark)

b) i) Eutrophication is the enrichment of water bodies with minerals or nutrients like nitrates / phosphates / sulphates; due to discharge of sewage/ domestic effluent water; containing water detergents / run off water fertilizers leading to rapid growth of aquatic plants /phytoplankton's; (3 marks)

ii) Effect of eutrophication;
- Excessive growth of aquatic plants / proliferation of aquatic plants blocks light from reacing the plants underneath and thus plants will not photosynthesize;
- Plants die and decompose leading to the depletion of dissolved oxygen;
- Animals also die or suffocate;

(3 marks)

c) Nitrogen (IV) oxide or sulphur (IV) oxide (1 mark)

5. a) i) Is a condition where male part / stamens mature and shed pollen grains before female part / stigma / pistil of the same flower is ready to receive them; (1 mark)

ii) Self-sterility – is a condition where pollen grains from anthers cannot grow on the stigma incompatible to the stigma of the plant / flower; (1 mark)

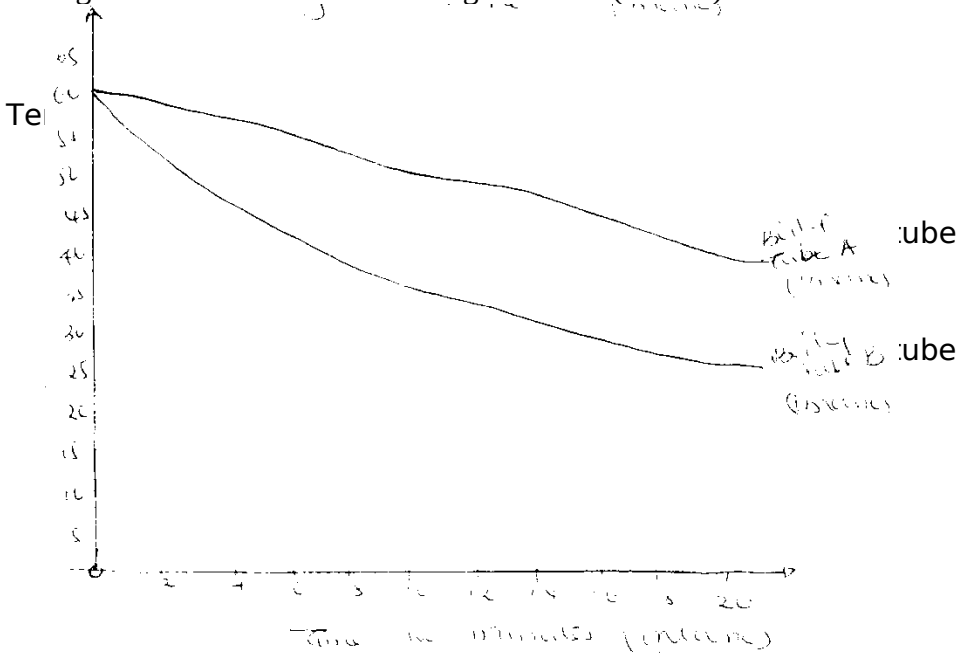
b) i) Q – Antipodal cell;
R – Polar nucleus / polar body;
S – Egg cell / functional egg;
(3 marks)

ii) - Offer path through which the male gametes reach the embryo sac to enhance fertilization;
- Prevent other pollen grains from developing into pollen tube hence no multiple fertilization of embryo sac;
- Secrete enzymes that digest the stigma or ovary tissue;
Mark first two points

SECTION B

6. a) A graph showing heat loss on tubes A and B against time (1 mark)

(1



Suitable scale (1 mark) X – axis
Y – axis

NB Curves must be labelled

6 marks

b) i) Rate of heat loss in boiling tube A

Rate in A per minute = $\frac{56-48.5}{15-5}$ = 0.75°C

0.75°C ± 0.05 per minute

Rate in B per minute = $\frac{48-34}{15-5}$ = 1.4°C ± 0.05 per minute

(4 marks)

ii) Test tube B has a larger surface area making it to loose heat to the surrounding faster than boiling tube A which has a smaller surface area hence loses heat slowly; (2 marks)

iii) A rat has a larger surface area to volume ratio compared to an elephant; hence the rat loses heat at a faster rate than an elephant; or an elephant has a smaller surface area to volume ratio compared to a rat; hence loses heat slowly than a rat; (2 marks)

c) i) Insulate against heat loss to the surrounding; (1 mark)

ii) - Subcutaneous fat (layer) or adipose tissue;
- Fur / hair
(2 marks)

d) - Are active always; even under cold conditions;
- Can survive in any habitat / wide range of habitats (both cold and hot);
- Able to escape from predators, or able to search for food / mates under all conditions;
(3 marks)

7. a) Comparative embryology is comparing formation and development of embryos; this study shows that vertebrate embryos have similar morphological features during their early development and it is impossible to tell them apart; this indicates a common ancestry; some features include single circulatory system, segmented myotomes gill slits / visceral clefts, notochord and tail.

Mark any two points

b) **Structure and functions of various parts of the human ear. (18 marks)**

The ear is an organ involved in perceiving sound and maintaining body balance and posture. It has the following structures to carry out various functions;

- Pinna – Its funnel shaped to collect and direct sound waves into the external auditory meatus;
- External auditory meatus – concentrates or directs sound waves to the tympanic membrane which vibrates; has hairs that prevents entry of dust particles or any foreign materials to avoid obstruction of sound waves; has wax secreting cells that secrete wax to trap insects, dust or foreign materials that can damage the eardrum;
- Tympanic membrane – Is a thin membrane which vibrate according to sound waves that hit it; converting sound waves into vibrations; sound waves are then transmitted to ear ossicles;
- Ear ossicles – are three small bones namely malleus, anvil and incus; they are joined firmly to one another by ligaments / muscles to transmit vibrations across the middle ear; they form a system of lever which amplify and transmit sound vibrations to the oral window; they are suspended in the air by muscles to vibrate more freely; and prevent excessive vibrations;
- Oral window / Fenestras ovalis – Thin membrane to vibrate effectively; and smaller in size than tympanic membrane; it amplifies vibrations; and transmits them to the fluids in the cochlea;
- Cochlea – Has fluids perilymph and endolymph; that distort / displace sensory hairs thereby generating a nerve impulse; is coiled to offer a large surface for many sensory cells for hearing; has the organ of corti that has auditory cells that generate nerve to convey impulses to the brain for interpretation i.e hearing;
- Eustachian tube – Opens at the Pharynx to communicate to the mouth cavity; to equalize air pressure in the middle ear with the atmospheric air pressure;
- Round window / Fenestra rotunda – Is a thin membrane that stops disturbance / displacement / distortation of cochlea fluid; by pushing towards the middle ear for vibrations to die / diffuse off;
- Vestibular apparatus – Consists of three semi-circular canals with ampula that detects the direction of movement of the head; has succulus and utriculus with an otolith that detects the position of the head with respect to gravity; endolymps flows to displace the sensory hairs that detect body balance; and vestibular nerve that transmits impulse to the brain for interpretation; i.e position or balance of the body;

25 marks maximum 18 marks

8. a) mechanism of gaseous exchange in a mammal

Gaseous exchange occurs in two stages:

i) Inhalation (Breathing in)

- External intercostal muscles contract; while internal intercostal muscles relax; this causes raising of the ribcage upwards and outwards; muscles of the diaphragm contract hence diaphragm flattens; The volume of the thoracic cavity increases; and pressure decreases than the atmospheric pressure; the higher air pressure in the atmosphere forces air into the lungs; and lungs inflate;

ii) Exhalation (Breathing out)

External intercostal muscles relax; while internal intercostal muscles contract; this causes the ribcage to move downwards and inwards; the muscles of the diaphragm relax; and the diaphragm assumes a dome – shape; this makes the volume of the thoracic cavity to decrease; while pressure increases compared to the atmospheric pressure; higher pressure in the thoracic cavity forces air out of the lungs; and the lungs deflate

(16 marks)

b) Mechanism of stomatal opening:

During the day photosynthesis takes place in the guard cells; forming sugar / glucose; glucose is osmotically active hence guard cells draw water by osmosis from adjacent epidermal cells; guard cells become turgid and bulge outwards; thin outer wall expands faster hence thick inner wall curves; causing the stomatal aperture to open;

5 marks maximum 4