

MANGU HIGH SCHOOL

NAME: Marking Scheme ADM. NO.

CLASS:



231/2

BIOLOGY

Paper 2

THEORY

MOCK EXAMS - 2022

Time: 2 Hours

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

Instruction To Candidates

- This paper consists of **TWO** sections A and B.
- Answer all questions in section A.
- Answer question 6 [compulsory] and any other one question [7 or 8] in the spaces provided after question 8 from section B

For Examiner's Use Only

Section	Question	Max. Score	Candidates Score
A	1	8	
	2	8	
	3	8	
	4	8	
	5	8	
B	6	20	
	7	20	
	8	20	
TOTAL SCORE		80	

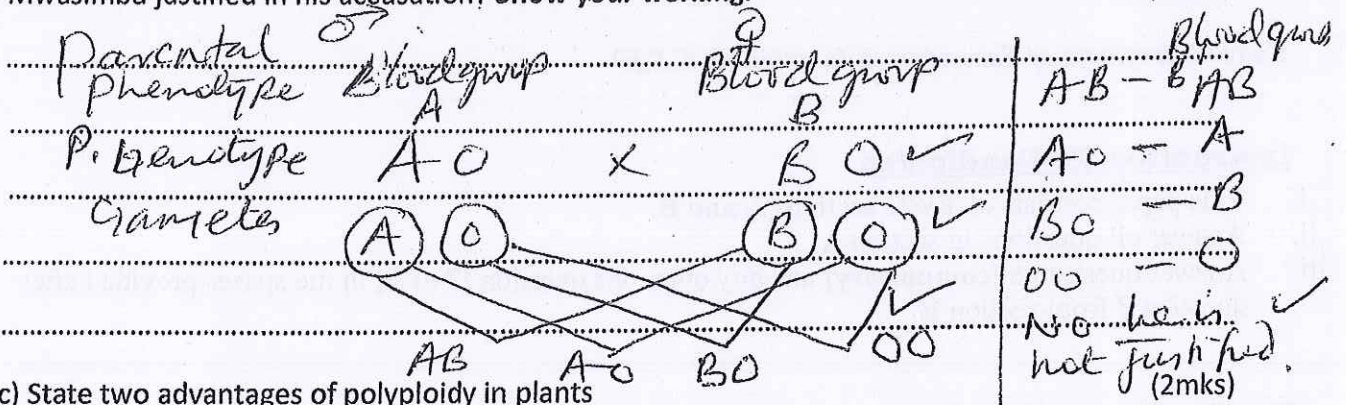
This paper consists of 11 printed pages. Candidates should check the question paper to ensure that all pages are printed as indicated and no questions are missing.

SECTION A (40 MARKS)
Answer All questions in this section

1.a) Explain why people with sickle-cell trait have an advantage of surviving malarial attack than those with normal red blood cells (2mks)

Sickle cell-shaped Red blood cells have less surface area to carry the malaria parasite; hence they cannot carry the parasite that causes the malarial disease.

b) Mr. Mwasiimba accuses his wife of infidelity after the birth of a child. He is heterozygous of blood group A and his wife is heterozygous for blood group B. If the child is blood group O, is Mr. Mwasiimba justified in his accusation? Show your working. (4mks)

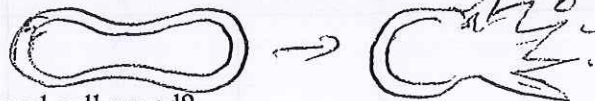


c) State two advantages of polyploidy in plants

- (i) leads to increased yields;
 - (ii) early maturity;
 - (iii) Resistance to drought/pests/disease;
- (Any 1st 2)

2.A form 1 student placed a red blood cell in a solution and made an observation as follows.

Start of experiment/ end of experiment



a) i) In what solution was the red blood cell placed?

Hypotonic solution;

(1 mark)

ii) Explain the observation above.

(2 marks)

The red blood cell absorbed water molecules by osmosis; & burst; swell and burst;

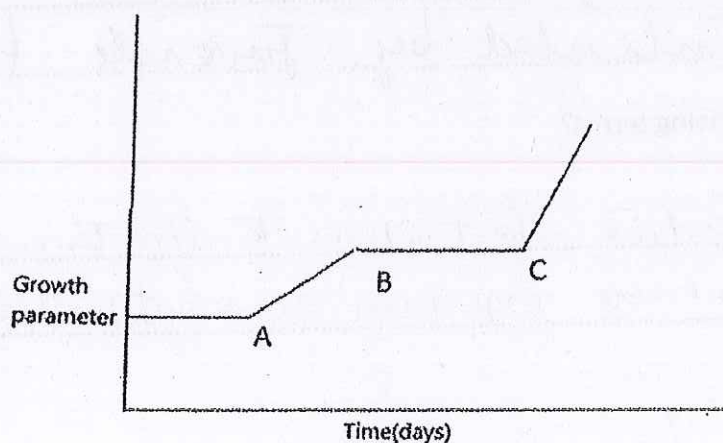
b) If the red blood cell was replaced by a plant cell what would be the observation. (2 marks)

A plant cell will absorb water by osmosis; and becomes turgid;

c) Why don't the red blood cell undergo the same changes as above while in the body. (3 marks)

Red blood cell lack rigid cellulose cell wall; that prevent the plant cells from bursting; when they absorb water hence they burst;

3. The graph below shows the growth pattern of an organism.



(a) Name the type of growth curve shown above.

(1mk)

Intermittent / discontinuous curve;

(b) Name the phylum where organisms show the above curve

(1mk)

Arthropoda;

(c) Name the hormones that influence the growth above.

(2mks)

Juvenile hormone; Ecdysone hormone;

(d) Give reasons for the shape of the graph between:

(i) A and B

(2mks)

Rapid growth; due to the shedding off of the exoskeleton initiated by secretion of ecdysone;

(ii) B and C

(2mks)

Constant growth; due to accumulation of exoskeleton initiated by juvenile hormone;

4.(a) What is meant by the following terms?

(i) Adaptive radiation

(1mk)

It's the modification that occurs to structures with common ^{ancestral} origin to enable organisms to adapt & exploit different environment;

(ii) Vestigial structures

(1mk)

Are structures that have ceased to be functional for a long time, & therefore have become greatly reduced in size or rudimentary;

b) Evolution is an ongoing process. State two pieces of evidence which suggest that evolution is still taking place. (2mks)

Natural selection in action;
Resistance to drugs; (pesticides & antibiotics)

c) Explain how the following factors influence natural selection.

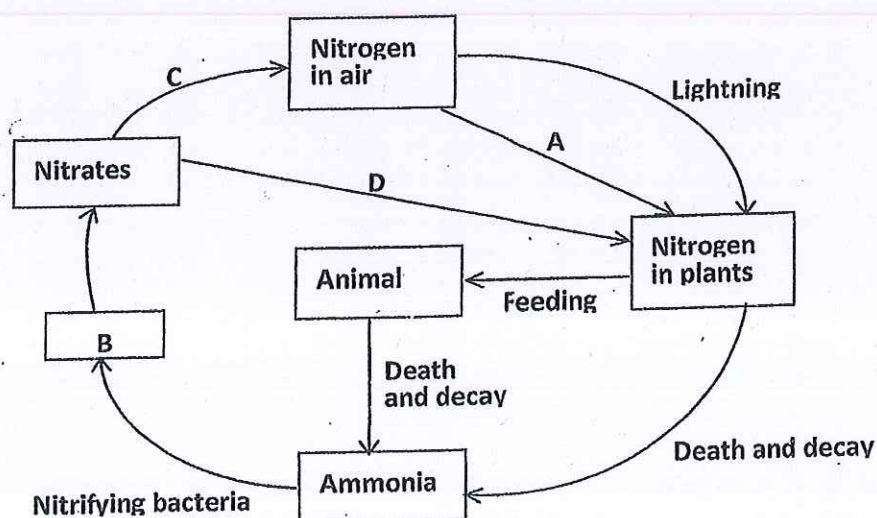
i) Predators (2mks)

Species that are well adapted, survive, while that which is not well adapted, is predicted and may become extinct;

ii) Diseases (2mks)

Species/organisms that have resistance to a certain disease survive, while those susceptible are eliminated/die;

5. The diagram below represents the nitrogen cycle.



a. Identify the processes labelled A and D.

(2 marks)

A - fixation
D - Absorption

b. Name the compound represented by B.

(1 mark)

Nitrate

c. Name the group of organisms labelled C.

(1 mark)

Denitrifying bacteria

(i) Name the group of plants that promote process A.

(1 mark)

Leguminous plants

(ii) In which part of the plant does process A take place?

(1 mark)

Root nodules

d. How would excess pesticides in the soil interfere with process A?

(2 marks)

It kills the Rhizobium/bacteria
hence no fixation

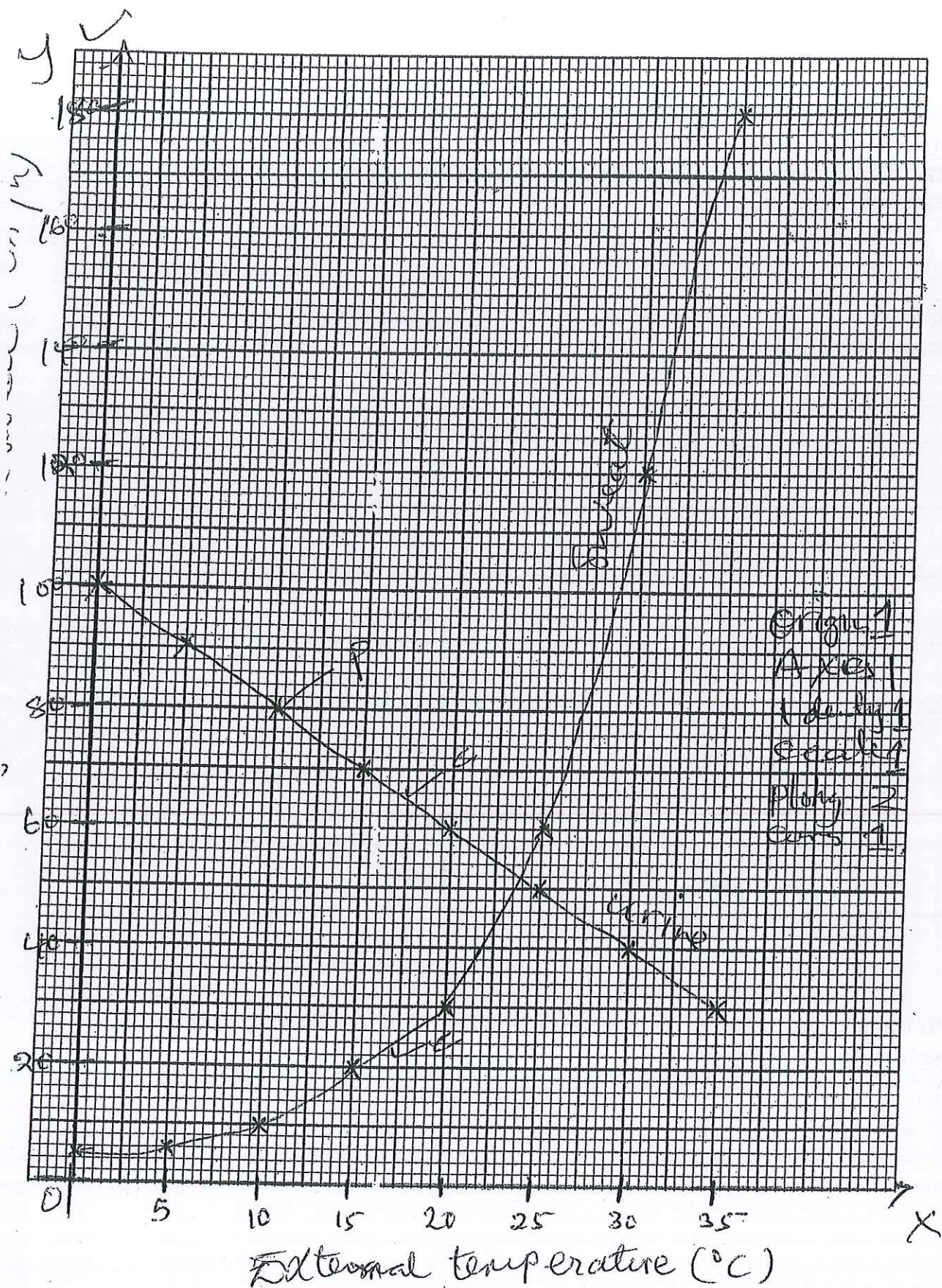
Section B

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 urine and sweat vary with external temperature

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

- (a) On the grid provided, plot the quantities of urine and sweat produced against external temperature
(7 marks)



(b) At what temperature is the amount of sweat and urine produced equal?

(1 mark)

$24^{\circ}\text{C} \pm 0.5$

(c) What happens to the amount of sweat produced as the temperature rises?

Explain your observation

(3 marks)

Sweat production increases with increase in temp; high temp increases the evaporation rate and hence more sweat converted to vapour. This loses latent heat of vapourisation from the body hence cooling;

(d) Explain the observation made on the amount of urine produced. (3 marks)

An increase in temp decreases the amount of urine produced; this is due to sweating that raises the osmotic pressure of blood. A lot of water is then reabsorbed into the blood from the kidney tubules resulting in production of little concentrated urine;

(e) How are the following parts of the mammalian skin adapted for temperature regulation during cold weather? (6 marks)

Hair: When erectapili muscles contract, causes hair to stand erect and trap air which act as insulator against heat loss;

Sweat glands When cold sweat gland releases less sweat; hence less evaporation leading to less heat loss;

Blood vessels

When cold blood vessels constrict; less blood flows near skin surface reducing heat loss by radiation;

7. How is the mammalian eye adapted to its functions?

Sclera/sclerotic layer; white fibrous layer; made up of thick connective tissue; protects the eye; maintains shape of eyeball; Cornea; transparent; disc-shaped layer; that allows light to enter the eye; refracts light towards the retina; Conjunctiva; delicate membrane; lining the inside of the eyelid; protects the cornea/eye; Eyelids and eye lashes; thin muscle with hairs; protects the cornea/eye from mechanical/chemical damage/protects the eye from entry of foreign particles protects retina from bright light; Choroid; dark pigmented and membranous layer; that prevents light reflection within the eye/absorbs light; to prevent distortion of the image; has blood vessels; that nourish eye/retina/supply oxygen/remove carbon (IV) oxide and wastes; extends to form the ciliary body and iris; Ciliary muscles; have elastic muscles that contract and relax; to alter shape/curvature of lens during accommodation; Ciliary body; thickened front edge of the choroids layer; that produces aqueous humour; Suspensory ligaments; made up of elastic connective tissue whose contraction and relaxation helps to adjust the shape of lens during accommodation/holds lens in position; Lens; transparent; biconvex; balloon-like; it refracts light rays/focus light onto the retina; Vitreous humour; nourishes cornea/lens; refraction of light; maintains eyeball shape; Iris; thin circular ring; with circular and radial muscles; it gives eye colour/absorbs light; controls the amount of light entering the eye/adjusts size of pupil; Pupil; an aperture through which light enters the eye; Retina; has photoreceptor cells/rods/cones for image formation; generates impulses to the brain for interpretation; Fovea/Yellow spot; with only cones; for high visual acuity/most sensitive part of the retina Blind spot; point where nerve fibres emerge from the optic nerve/where optic nerve leaves eye/point where nerve fibres and blood vessels enter the eye; Optic nerve; transmits impulses to the brain; Muscles; inferior and superior oblique muscles; move eye from left to right; superior and inferior rectus muscles; move the eye up and down; external and internal rectus muscles steady the eye in its up and down movement; Tear/Lachrymal glands; secrete a watery and saline fluid containing lysozymes/lytic enzymes/is antiseptic (tears); that moisten the conjunctiva and cornea; washes away dust and other foreign objects; kills microorganisms entering the eye; Max. 20 mks

8. a) State four characteristics of gaseous exchange surfaces.

Moist; Highly vascularized; Thin walled; Large surface area; Well ventilated. 4mks)

Discuss the various mechanisms of opening and closing of stomata

Photosynthetic theory; during the day, guard cells carry out photosynthesis manufacturing glucose; This increases the osmotic pressure of the sap vacuole; which becomes higher than that of the neighbouring epidermal cells; guard cells therefore take in water by osmosis; and become turgid; the outer thin wall stretches easily; pulling the thicker inner wall outwards; thus the stomata opens; At night, there is no light hence no photosynthesis takes place; plant cells respire using up more glucose; the osmotic pressure of the sap vacuole of the guard cells reduces; becoming lower than the neighboring epidermal cells; the guard cells lose water by osmosis; to adjacent epidermal cells; they then become flaccid; pulling together the thick inner walls; and stomata closes; Enzymatic inter-conversion between starch and glucose/sugar; At day time, plants continuously use carbon (IV) oxide for photosynthesis; leading to an increase in the pH of the guard cells; this causes starch to be converted to sugar/glucose; the glucose increases the osmotic pressure of the guard cells; hence water is taken in by osmosis; the cells become turgid and bulge outwards; causing the stomata to open; At night, no photosynthesis occurs but respiration takes place; carbon (IV) oxide accumulates in guard cells; lowering the pH; the low pH favors conversion of glucose into starch; starch is osmotically inactive; this lowers the osmotic pressure of guard cells; guard cells therefore lose water by osmosis to the adjacent epidermal cells; become flaccid; pulling together the thick inner walls; and the stomata closes; Active ion exudation; during the day, there's an accumulation of potassium and sodium ions; as a result of active pumping of the ions by the ATP formed through photosynthesis; carbon (IV) oxide fixation occurs in the guard cells; the guard cells become turgid; and stomata open; At night, before the stomata close, the ions diffuse out of the guard cells into epidermal cells; the osmotic pressure of guard cells is lowered; they lose water to epidermal cells by osmosis; and become flaccid; thereby closing the stomata; Max. 16 mks