

PRESIDENT'S OFFICE
REGIONAL ADMINISTRATION AND LOCAL GOVERNMENTS
SAME AND MWANGA SECONDARY SCHOOLS EXAMINATION SYNDICATE (SAMWASSES)



FORM SIX PRE - MOCK EXAMINATIONS - 2022

BIOLOGY 02
MARKING SCHEME

1. a) – These are mainly terrestrial
- They have a well defined head, thorax and abdomen
 - They have one pair of antennae
 - Usually three pairs of mouth parts
 - They have three pairs of joined legs
 - Gaseous exchange is through tracheal system
- (Any 5 points @ 02 marks = 10marks)*
- b) i) Pollination
- Insects are clearly among the most important pollinators and their efforts are estimated to be 80% of all pollinators.
- ii) Food
- Honey is certainly high on the list of products made by insects that may be consumed by humans.
- iii) Silk
- Most silk is produced from insects
- iv) Natural and biological control
- The balance of nature depends on the activities of parasites and predators, majority of which are insects. Researchers use this concept in biological control and have been dramatically successful in many programs.
- v) Heretics
- Fruit flies have been long used in genetic studies this is because of their short life span.
- iv) Dermestids for cleaning skelelfins
- Carpet beetles are small insects that feed on almost anything organic including cereals. Even museums technicians use insects to clean skeleton of mammals.

(Any 5 points @ 02 marks = 10marks)

2. a) Hormonal control of osmoregulation

Water and salt depending on each other in the body when body lack water, the impulse send to the brain for the interpretation, this information controlled by ant diuretic hormone (ADH) made in the hypothalamus and pass to posterior pituitary gland when blood became more concentrated when little water has been drunk, osmoregulation in posterior release ADH hormones, that travels in the blood to the kidney where it increases permeability distal convoluted tubule and collecting duct to water. Water reabsorbed used in different activities in the body.

When body lack salt, this controlled by aldersterone hormones which influence water re absorption, the hormones secreted by cortex region of the kidney nephron. Decrease in the blood sodium leads to decrease blood volume because less water enters the blood by osmosis this turn reduces blood pressure, the juxtaglomerular complex release an enzymes called rennin. Rennin activate a protein in the blood plasma, produced in the liver to form the active hormone angiotensin from angiotensinogen to increase pressure of the body.

b) Excretion

Kidney filters out toxins, excess salts and nitrogenous wastes created by cell metabolism.

Water balance

Kidney is key controller of urine formation as they break down chemicals and leave the body with balance level of water.

Blood pressure regulation

Kidney needs constant pressure to filter blood.

Red blood cell regulation

When kidney does not get enough oxygen they send distress call to form RBC's as they stimulate bone marrow to produce more RBC's.

Regulation of pH of the blood

Kidney excretes H^+ into urine, but they also conserve bicarbonate ion which are important buffer of H^+ .

Synthesis of vitamin D

Kidney synthesizes calciferol which is an active form of vitamin D.

Regulation of the ionic composition of blood

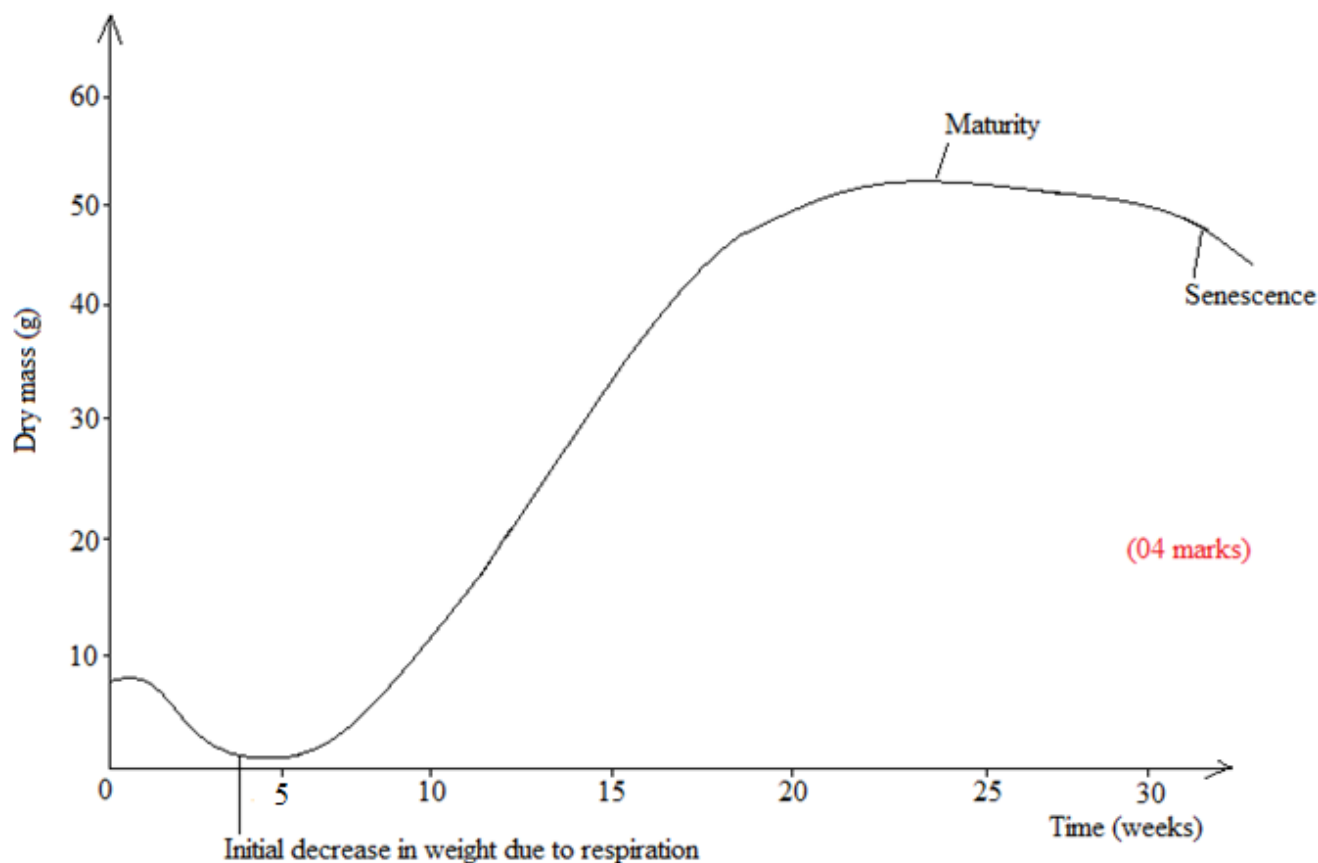
Kidney regulates the quantities of ions in the blood such as Na^+ , K^+ , Ca^{2+} , Cl^- and Phosphorus ions.

(Any 5 points @ 02 marks = 10marks Mention – 01 mark Explanation – 01 mark)

3. a) Differences are:

Plant cells	Animal cells
No aster formation	Asters are formed during prophase stage
Cytokines is occurs from the centre outwards	Cytokines is occurs from outwards to inwards (centre)
Occurs in meristematic cells	Occurs in somatic cells

b) Growth curve of annual plant



Explanations:

- Growth curve of maize plant (annual plant) is a curve that is obtained by considering parameters such as dry mass which is plotted against time.
- The curve obtained is an S-shaped growth curve.

From the graph

- There is a decrease in dry mass at germination because the food stored in cotyledons and endosperm is oxidized to produce energy.
- As foliage leaves are formed, the seedling starts to photosynthesize food makes use of it and store some. This leads to gradually increase in mass.
- As growth continues, the plants develop full leaves. At this stage, photosynthesis is at maximum. The rate of anabolism exceeds catabolism leading to an exponential increase in dry mass, hence exponential growth of a plant.

- When the plant is fully matured, catabolism is equal to anabolism and therefore no growth.
- This is followed by negative growth/senescence during which catabolism exceeds anabolism. At this point, the cell death is high.
- The decrease in dry mass contributes into the dispersal of seeds and fruits.

(06 marks)

4. a) i) Heretic code is a triplet code

ii) Heretic code is universal

iii) Heretic code is degenerate

iv) Heretic code is none overlapping

v) Heretic code is perntualed

(Any 5 points @ 01 mark = 05marks)

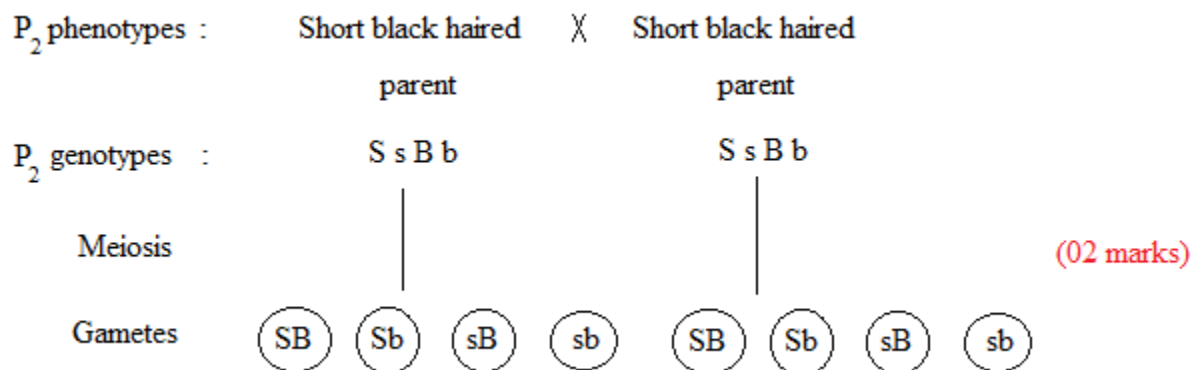
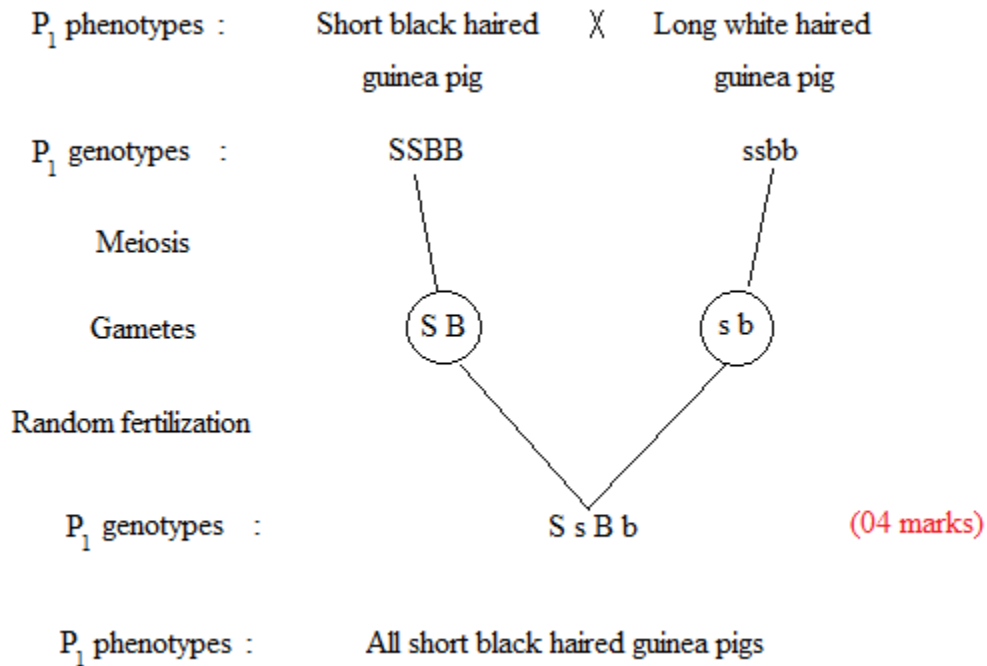
b) i) The dominant alleles are short hair and black hair. This is because short black hair appeared in the F_1 phenotypes (02 marks)

ii) Let

B – Represents black hair

b – Represents white hair

S – Represents short hair (02 marks)
s – Represents long hair



Punnett square to show random fertilization

$\sigma \rightarrow$	SB	Sb	sB	sb	
$\uparrow$ ♀	SB	SSBB	SSBb	SsBB	SsBb
	Sb	SSBb	SSbb	SsBb	Ssbb
	sB	SsBB	SsBb	ssBB	ssBb
	sb	SsBb	Ssbb	ssBb	ssbb

(04 marks)

The results of F_2 phenotype are:

- 9 – Short black hair guinea pig
- 3 – Short white hair guinea pig
- 3 – Long black hair guinea pig
- 1 – Long white hair guinea pig (01 mark)

5. a) i) The use and disuse of body parts $\left(00\frac{1}{2} \text{ mark}\right)$

ii) The inheritance of acquired characteristics $\left(00\frac{1}{2} \text{ mark}\right)$

- According to Lamarck the environment creates the need that may lead to a changed pattern of behavior of an organism
- This can lead to either use or disuse of certain body part or structure. The more body part is used, the stronger and more efficiently it becomes and vice versa. That is if the body part is less used / not used, it gradually disappears.
- The new traits acquired as a result of use and disuse of body parts, become part of hereditary and can be transmitted to the next generation.
- The concept of inheritance of acquired characteristics states that “Characteristics that individuals acquired during life time as they adapt to their environment, become part of their genetic makeup and are thus handed down from one generation to another.

(10 marks)

b) i) Homologous structure

- These are body parts or organs of different species that share similar basic form but performs different roles, such structures are said to have the same origin, example limbs in all vertebrates are built in the same basic pattern called pentadactyl pattern. However due to adaptive radiation similar part adapted to perform different roles. (03 marks)

ii) Geographical distribution

- Geographical distribution of plants and animals provides evidences for evolution. It is believed that species originated in a given area and dispersal outward from that point. The extent of dispersion depends on the success of an organism efficiency of dispersal mechanism and the existence of natural barriers such as ocean, mountain ranges and desert. (03 marks)

iii) Analogous structure

- These are body parts which have different construction and origin but perform similar roles. Analogous structures only bear superficial similarities and therefore support convergence evolution. In this process unrelated or distantly related organisms evolve similar body forms, colorations, organs and adaptation. (03 marks)

6. a) Energy from the sun is converted to chemical in photosynthesis by green plants. The conversion is about % efficient. The total energy which a plant receives per unit area per unit time is known as gross primary productivity. Some of this energy is used by the plants for different activities example physiological ones that is growth, reproduction. The remaining energy (Net Primary Productivity) NPP is made available to consumers as the green plants are grazed then energy is transferred to herbivores. When the carnivores eat herbivores energy is transferred to them but less amount that received by herbivores. This is why not all the energy from producers goes to the consumers because; (06 marks)

- Some of the energy is used for different metabolic activities (01 mark)
- Not all parts of producers are consumable (01 mark)
- Not all the consumable parts are digestible (01 mark)
- Some of the energy is also lost in form of heat (01 mark)

b) Organisms are captured counted and marked then released back to the ecosystem without harming them

- The second capture is performed after some times and all organisms captured are counted.
- Then these captured (marked) are also counted down during this time.
- Then estimation of population size is done by;

$$ETP = \frac{\text{No of organisms of 1}^{st} \text{ sample} \times \text{No of organisms of 2}^{nd} \text{ sample}}{\text{Number of marked organisms recaptured}}$$

(10 marks)