

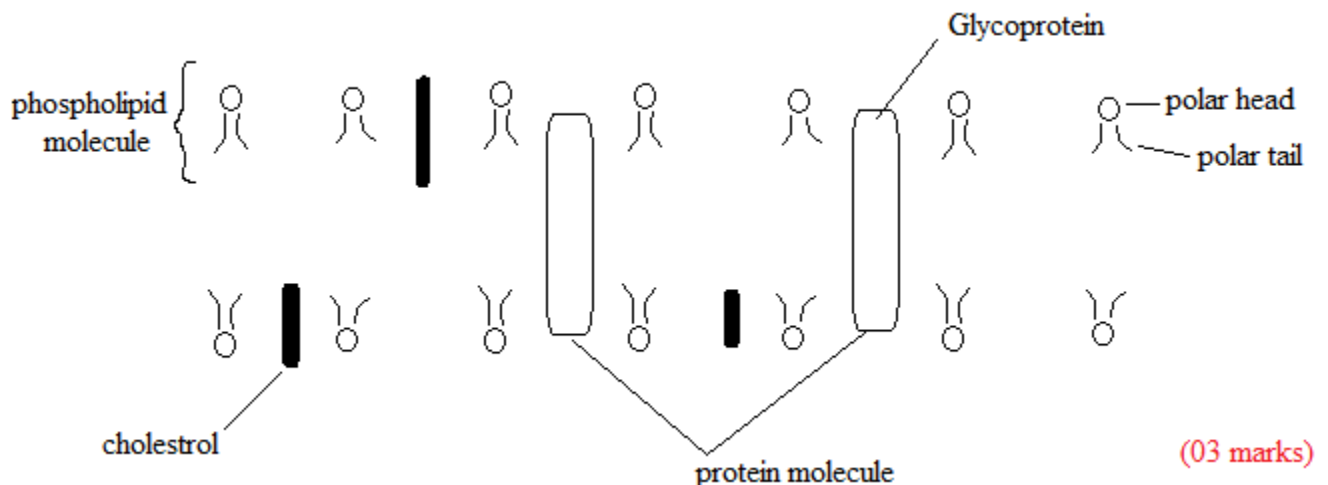
PRESIDENT'S OFFICE
REGIONAL ADMINISTRATION AND LOCAL GOVERNMENTS
SAME AND MWANGA SECONDARY SCHOOLS EXAMINATION SYNDICATE
(SAMWASSES)



FORM SIX PRE - MOCK EXAMINATIONS - 2022
BIOLOGY 01
MARKING SCHEME

1. a) i) The fluid mosaic model suggest the presence of protein and lipid layer. The lipid layer has got glycolipids and phospholipids also consists of two ends the polar head and non – polar tail. According to this model the membrane structure is not static instead it over changing dynamic structure. Also the protein layer is not continuous but consists of protein molecules depressed in lipid layer. Hence the model suggests that the mosaic protein molecule floats on the lipid layer hence fluid mosaic model. (03 marks)

ii)



b)

- i) Presence of granna that increases the surface area for photosynthesis
- ii) Presence of chlorophyll molecules for trapping of the sunlight for photosynthesis
- iii) Presence of appropriate enzymes for the photosynthesis to take place
- iv) Presence of DNA molecules which ensures it to be genetically independent

v) Presence of the pores on the surface membrane that ensures exchange of materials between organelles and the environment (Any 4 points @ 1 mark = 04 marks)

2. a)

i) Stability – Does not change because no new information is accommodated.

ii) Time duration – Takes/saves time (Takes short time) because it considers only few observable features

iii) Expenses – It is cheap because no research is needed and equipments to conduct the process

iv) Skilled personnel – Does not require experts as only morphological/observable features are considered

b) 1 (a) Body divided into two parts Spider

(b) Body divided into three partsGo to 2

2 (a) One pair of wingsHousefly

(b) Two pairs of wingsGo to 3

3 (a) Powdered wingsButterfly

(b) Membranous wingsCockroach

3. a) i) Refractory period

- Prevents spreading of action potential in both directions

- Separate one action potential from another. (01 mark)

ii) Adaptation

- Prevents over stimulation of neuron which may damage the effector (01 mark)

b) Properties of hormones

- Travels through blood stream

- Show their effect to the site away from its source

- Are very specific to a particular target

- Are soluble organic molecule

- Are effective even at low concentration

(Any 5 points @ 1 mark = 05 marks)

c) – Presence of specific metabolites in the blood

- Presence of another hormone in the blood

- Stimulation by neurons from autonomic nervous system

(Any 3 points @ 1 mark = 03 marks)

4. a) i) – By acting as carbon dioxide pump;

The malate shunt increases carbon dioxide in the bundle sheath cells, thus increasing efficiency with which RUBP carboxylase works up. *(02 marks)*

- Hydrogen pump;

By acting as a hydrogen pump, the malate carries hydrogen from NADP in the bundle sheath cells where $NADPH_2$ is regenerated. *(02 marks)*

ii) The advantage is that $NADPH_2$ is generated by efficient light reaction in the mesophyll chloroplasts and can be used as reducing power in the Calvin cycle of bundle sheath chloroplasts whose own synthesis of $NADPH_2$ is limited. *(02 marks)*

b) i) NADP is used to form NADPH it must be reduced with more electrons and hydrogen.

(02 marks)

ii) PS1 and PS2: produce ATP and $NADPH_2$ which are used in the dark reaction of photosynthesis

(02 marks)

5. a) Antenatal blood circulation

i) In the foetus the blood from the heart is pumped by aorta to the placenta through umbilical artery.

(02 marks)

ii) From placenta it leaves through umbilical veins (oxygenated blood) to the liver ductus venosus and small portion to the liver. *(02 marks)*

iii) From ductus venosus blood is delivered into inferior vena cava which then delivered into right atrium (RA) *(02 marks)*

iv) From right atrium (RA) some blood goes direct to the left atrium (LA) through foramen ovale and some goes to right ventricle (RV) when it is pumped to the aorta through special artery called “ductus arteriosus” *(02 marks)*

v) In the foetus blood bypasses the lungs and gut since pulmonary vein and arteries together with portal vein not yet developed. *(02 marks)*

6. a)

Metabolic pathway	Precise location	Substrate	Products	
Glycolysis	Cytoplasm	Glucose	Pynevate	(02 marks)
Kreb's cycle	Matrix of mitochondria	Pynevate	$FADH_2 / NADH_2, CO_2$	(02 marks)
Alcoholic Fermentation	Cytoplasm	Pynevate	Ethanol CO_2	(02 marks)

b) i) Temperature

All metabolic process are enzymes controlled reaction so does the process of respiration. Enzymes functioning are largely controlled by temperature. For enzymes to work best there should be optimum temperature which ranges from 5°C – 40°C. Below 5°C the enzymes are inactive and above 40°C they are denatured. (02 marks)

ii) Size of an Organism

Small organisms have larger surface area to volume ratio hence loses more energy to the environment hence respire more than that of larger organisms (02 marks)

7. a)

i) It has long tail for movement

ii) It has acrosome which release the hydrolytic enzyme for digesting membrane of the egg

iii) It has many mitochondria for energy production

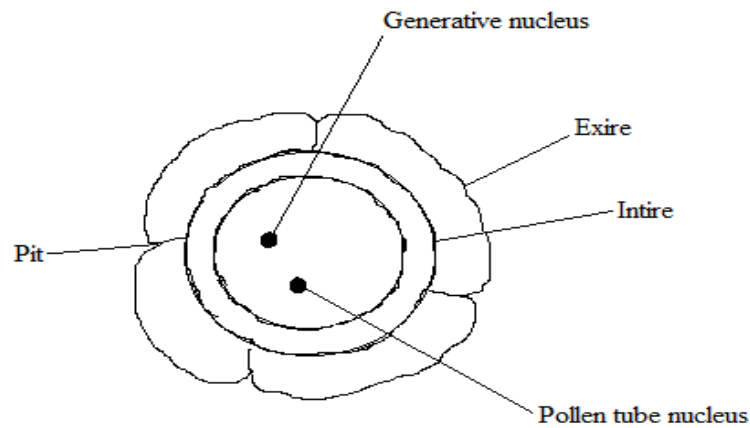
iv) It has chemical attractant ability in order to reach the egg

v) It has haploid in term of chromosomes in order maintain genetic status

vi) It has nucleus which carry the genes

(05 marks)

b)



C = (00 $\frac{1}{2}$ marks)

D = (02 marks)

L = 0 (02 $\frac{1}{2}$ marks)

8. a) Capacitation

- This is the process whereby sperm spend hours in female genital track usually about seven hours, during this time they undergo the activation process; 'capacitation'
- This process involves removal of layer of a layer of glycoprotein and plasma protein from the outer surface of the sperm
- Cholesterol is also lost from the cell surface membrane around the sperm head weakening the membrane. The membrane also become more permeable to calcium ion which has the effect of increasing the heating activity of the sperm tail and promoting acrosomal reaction

(05 marks)

b) Acrosomal reaction

- This is the process whereby the membrane of the acrosome ruptures as the result of the sperm reaching the secondary oocyte normally high up the oviduct. The rupturing process releases the hydrolytic enzymes normally hyaluronidase and protease stored in the acrosome to be rapidly released.
- These changes of the sperm head is what is known as acrosomal reaction.

(05 marks)

c) Cortical reaction

- This involves the formation of fertilization membrane in order to prevent polyspermy immediately after fertilization by hardening the zona pellucida.
- This reaction also destroys the spermatozoa receptor sites to prevent attachment of sperms.

(05 marks)

9. a) – The external intercostals muscles contract

- The ribcage moves outwards

- The diaphragm contracts and flattens
- The volume of thoracic cavity increases
- Air pressure decreases and air is drawn into the lungs

(06 marks)

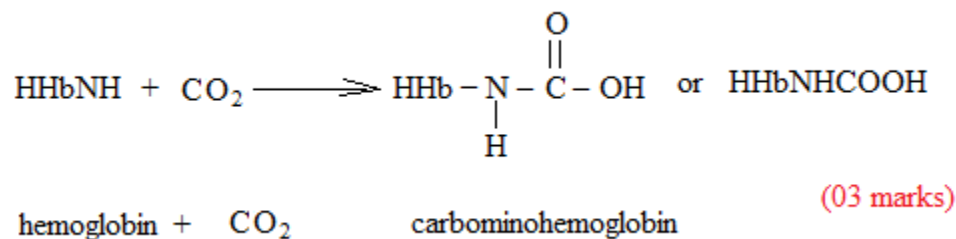
b) Carbon dioxide is transported in three ways;

i) As physical solution / dissolved CO_2 (aqueous solution)

- 5% of CO_2 is transported in this form.
- The CO_2 is transported in solution in the blood plasma
- The CO_2 dissolve directly in blood and transported in this form (03 marks)

ii) In combination with hemoglobin

CO_2 combines with hemoglobin to form a compound known as carbaminohemoglobin. About 10 – 20% of CO_2 is transported in this way.



iii) As hydrogen bicarbonate ions (HCO_3^-)

Most of CO_2 (about 85%) in the body is transported as hydrogen carbonate.

CO_2 enters RBC's in tissue capillaries where it combine with H_2O to form carbonic acid (H_2CO_3).

Then carbonic acid dissociate to form Bicarbonate ions (HCO_3^-) and (H^+)



10. a) Cohesion – tension theory

- It suggests that, plants are able to get water from the soil because water molecules are cohesive in nature

- Water molecules have the ability to hold each other without breaking, and then they can be drawn up from the soil particles into the root hairs by osmosis.
- H_2O is polar molecule such that, when its two molecules approach one another, the slightly negatively charged O_2 atom of one molecule forms a hydrogen bond with a slightly positively charged hydrogen atom of the other molecule.
- This generates attractive force that enhances movement of water from the roots to aerial parts of the plant.

(06 marks)

b) The categories of proteins are;

i) Ion channel proteins

- They form pores that allow ions to pass through and move to the cytosol / tonoplast.
- They establish a resting potential, shaping action potential and other electrical signals by gating the flow of ions across the membrane.

ii) Carrier proteins

- They carry solutes and ions from one side of a membrane to the other.
- They do not form pores in the membrane, they selectively bind the solute to their specific sites and transport them inside.

iii) Protein pumps

- They pump ions across a membrane against their concentration gradient through active transport.
- The ions such as H^+ and Ca^{2+} are transported this way.