

MARKING SCHEME

BIOLOGY

FORM 3

1. a) Explain the meaning of each of the following terms.

i) Cell

- Basic unit of organization in an organism

ii) Tissue

these are cells of a particular type grouped together to perform a certain function

b) Name the structures which are present in plant cells but absent in animal cells

- Chloroplast

- Cell wall

**c)i) Identify the nature of solution into which each cell was placed.
(2marks)**

A.Hypertonic solution

B .Hypotonic solution

**ii) Name the physiological process responsible for the observed results.
(1mark)**

Osmosis

**iii) Give the correct biological term used to describe cell A.
(1mark)**

Crenation

iv) Describe what would happen if a red blood cell was placed in the solution in which cell B was placed. (2 marks)

Red blood cells would gain water through osmosis and burst (haemolysed)

2. a) i) Define nutrition

- the process by which living organisms obtain and assimilate nutrients

ii) State the importance of nutrition

- for respiration to get energy
- for growth
- for development
- to repair and replace worn out and damaged parts and tissues

b) Differentiate the various modes of feeding

i) Autotrophism

- manufacturing food from simple organic substances
- types are photosynthesis and chemosynthesis

ii) Heterotrophism

- process of obtaining food from autotrophes and other organic substances

3. State the importance of photosynthesis

- formation of sugars/glucose which is a source of energy
- purification of air(CO₂ is used, O₂ is released)
- storage of energy to be used later in respiration
- stores energy in wood, coal, oil to be used later to run industries

4) a. i) Name the transport structures of a flowering plant

- xylem vessels and tracheids transport water and mineral salts from the soil
- Phloem vessels translocate manufactured food from leaves to other parts of the body.

ii) State the ways in which xylem vessels are adapted to their function

- lignified/thickened to prevent collapsing
- narrow to facilitate capillary
- no cross walls for continuous flow/column of water

- have bordered pits for lateral movement of water

5.i) What is transpiration?

- loss of water from plant to the atmosphere

ii) Name the sites through which transpiration takes place in a plant

- stomata (stomatal transpiration)
- lenticels (lenticular transpiration)
- cuticle(cuticular transpiration)

6.a) What is counter-flow system?

- Where water in which the fish lives flows in opposite direction across the gill.

b) What is the advantage of counter-flow system?

- maintains a diffusion gradient so that there is maximum uptake of oxygen
- oxygen continues diffusing into blood and carbon iv oxide into water

7) i) What is aerobic respiration

- respiration in the presence of oxygen

ii)State why accumulation of lactic acid during vigorous exercise lead to an increase in heartbeat

- lactic acid is poisonous to tissues and must be removed
- to increase supply of oxygen to tissues

iii)State the economic importance of anaerobic respiration

- brewing of alcohol
- biogas production
- compost manure formation
- silage formation
- baking bread
- production of dairy products
- fermentation of milk
- sewage treatment

Fermentation of tea in industries.

iv) What is oxygen debt?

amount of oxygen required to convert accumulated lactic acid to water, carbon IV oxide and energy

5. a) i) Define the following terms

i)Excretion

the process by which organisms get rid of waste products which result from chemical process which occur in living cells

ii)Homeostasis

maintenance of constant internal environment

6) State the functions of the liver

. Excretion

in this function the liver is aided by the kidney

deamination i.e. excess amino acids converted into urea and uric acid which is transported to skin and kidney for removal

detoxification where harmful substances are converted into harmless ones in the liver and transported to kidneys for removal

breakdown of worn out blood cells and haemoglobin and the residue excreted through the kidney to give urine a yellow tinge

Breakdown of sex hormones after they have performed their function and the wasted are released through the kidney and bile. c) i) What is the meaning of osmoregulation?

mechanism which regulates osmotic pressure of internal environment of an organism

the regulation/maintenance of salt/solute-water balance of an internal environment

7.a) State the importance of osmoregulation

- Maintenance of constant level of water and slats (osmotic pressure) for optimum/suitable conditions for metabolism suitable for cellular functions

b) State the ways by which desert mammals conserve water

- fewer glomeruli
- longer loop of Henle
- excretion of dry faeces or concentrated urine
- hump for fat to be metabolized to give metabolic water for use
- nocturnal, burrowing, aestivate or hibernate
- sweat glands few or absent
- more ADH (vasopressin)

c) Explain why some desert animals excrete uric acid rather than water

- uric acid is less toxic than ammonia, hence elimination of uric acid requires less water than ammonia therefore more water conserved
- uric acid being less toxic is safer to excrete where there is less water/desert

d) Explain why eating a meal with too much salt leads to production of a small volume of concentrated urine

- the concentration of salts in the blood rises leading to production of more ADH hence higher rate of water reabsorption by kidney tubules) Discuss the role of the following hormones in blood sugar control

e) Explain the part played by antidiuretic hormone in homeostasis

- Produced when there is less water (high osmotic pressure above normal level of salt concentration) in the blood.
- It acts on kidney tubules (nephron) thus increasing water reabsorption from tubules to the blood stream, thus restoring osmotic pressure
- When there is more water(lower osmotic pressure) or decreased salt concentration in blood, little or no ADH is produced, less water reabsorbed hence water loss in urine (more dilute urine) hence raising the osmotic pressure in body fluids/bloodii. Adrenaline
- produced by adrenal glands
- in high concentrations, it increases hydrolysis of glycogen and increases blood sugar

- it is usually released in emergency cases to increase glucose level for respiration
- this releases energy for the emergency

f) Distinguish between diabetes mellitus and diabetes insipidus

- diabetes mellitus is a condition resulting from insufficient production of insulin causing hyperglucaemia and presence of glucose in urine
- diabetes insipidus is a condition whereby less or no antidiuretic hormone is secreted hence a high volume of water is passed out in urine in a condition called diuresis

g) How can high blood sugar level in a person be controlled?

- administer insulin

h) Why does glucose not normally appear in urine even though it is filtered in the mammalian Bowman's capsule?

- glucose molecules are actively reabsorbed in the proximal convoluted tubules