

BIOLOGY

FORM TWO TERM 1 2023

MARKING SCHEME

1. i) Pitfall trap ✓ (1)
 ii) Sweep net ✓ (1)
2. a) Cytology ✓ (1)
 b) Taxonomy ✓ (1)
3. a) Species is the smallest unit of classification, whose members can naturally/freely interbreed to give rise to viable/fertile offspring's. ✓ (1)
 b) The second name which represents species should start with a small letter. ✓ (1)

The two names should be underlined separately ✓ (1)

- c) Because they do not belong to the same species. Only members of the same species can breed to give rise to off-springs.
4. Total magnification = eye piece lens magnification X objective lens magnifications

Therefore

$$\text{Magnification of objective lens} = \frac{\text{Total magnification}}{\text{Magnification of eye piece lens}} \quad \checkmark (1)$$

$$\checkmark (1)$$

$$\frac{X200}{X10} = X20 \quad \checkmark (1)$$

5. a) Cell membrane/plasma membrane ✓ (1)
 b) A – Phospholip layer ✓ (1)
 B – Protein layer ✓ (1)
 c) It encloses the contents of the cell ✓ (1) either

It allows selective movement of particles in and out of the cell ✓ (1)

6. a) Osmosis ✓ (1)

b) The solution in tubing X was more dilute than that in the beaker/solution in tubing X is hypotonic to be solution in to beaker ✓ (2). Water moved from the tubing into the beaker by osmosis/. Water molecules moved from the beaker where they are highly concentrated to where they are lowly concentrated. ✓ (½)

The solution in tubing Y had the same concentration as that in the beaker. The solution is isotonic. There is no movement of water in either direction.

Z

The solution in tubing Z was more concentrated than in the beaker or Z is hypertonic ✓ (½) to the solution in the beaker ✓. Water molecules moved from the beaker where there are more conc into the tubing by osmosis. Or in the beaker there are more free water molecules than in the tubing Z. free water molecules more from the beaker to the tubing through osmosis.

c) Uptake of water from the soil into the root hairs of plant roots ✓ (2).

- Uptake of water from the surrounding medium into the cells of microorganisms.
- Transport of water from the epidermal cells of the root to the cells at the centre of the root (support).
- Reabsorption of water from the kidney tubules (osmoregulation)
- Reabsorption of tissue fluid into the bloodstream at the venous end of the capillaries.
- Movement of H₂O from the veins of leaves through the leaf cells to the atmosphere during transpiration.
- Opening and closing of stomata.
- Feeding insectivorous plants.

7. a) Glucose
 b) Glycogen
 c) Starch

Act as a solvent in which all biology reactions take place

- It is a reactant in many biological reactions e.g. photosynthesis, hydrolysis of food molecules such as carbohydrates, fats and proteins.
- It is a solvent in which transport of nutrients, gases and waste products takes place.
- It is the solvent in which raw materials like minerals salts and finished products like sucrose are transported in plants.
- Helps in maintenance of constant body temperature in warm blooded animals because of its high specific heat capacity.
- It is responsible for turgidity of plant cells and hence the maintenance of an erect posture of plant.
- It is a habitat for many plants and animals.

8. a) Pepsinogen and trypsinogen

b) If secreted in active form, they would digest the cells which they are formed and also the lining of the glands that secret.

9. Structural factors

- Thickness of cuticle (rej. Cuticle alone)
 - Leaf size and shape
 - Location of the stomata/position
 - Number of stomata & size
 - Leaf fall
- } Rej. Stomata alone
- } Any

- Hairly leaves

Environmental

- | | |
|---------------|-------------------------|
| - Temperature | - Light intensity |
| - Wind | - Atmospheric pressure |
| - Humidity | - availability of water |

10. a) Young root ✓ (1)

b) Reason

- Presence of star-shaped xylem with phloem strands lying between the arms of the star ✓.
- Presence of root hairs ✓

c) A – function

- Increases the surface areas for absorption of water, mineral salts and gases ✓.
- Transport of water and dissolved minerals to the stem and the leaves ✓ (1).

11. Open circulatory system. Arthropods e.g. insects any correct

Closed circulatory system. (Any correct) ✓ (1) (mammals)

SECTION B

12. On the diagram (put) if correct) (in – half a mark, out – half a mark)

b) A – Aorta ✓ (1)

C – Semilunar valves ✓ (1) (at the base of the aorta)

c) Because D (left ventricle) has to pump blood all over the body whereas E (right ventricle) only pumps blood to the lungs. (Thicker walls help D to exert pressure to force blood all over the body)

✓ (1)

d) They have inherent contractility i.e they contract on their own without stimulation of nerve or hormones (myogenic) ✓ (1)

They can contract rhythmically throughout without fatigue

e) G. (pulmonary artery) carries deoxygenated blood from the right ventricle to the lungs ✓ (1).

13. a) To estimate the rate of transpiration by measuring the rate of water uptake by a plant shoot.

b) Stem of the shoot should be cut and fixed into a potometer under water to prevent air entering into the xylem vessels. Either

All joints should be water tight ✓ (1)

c) The rate of transpiration would increase ✓ (1). Because heat causes temperature to increase hence increasing the rate of evaporation ✓ (1) of water from mesophyll cells of the leaf and reduces relative humidity of the air outside the leaf ✓ (1).

ii) Rate would decrease ✓ (1). Because removal of the leaves reduces the surface available for transpiration ✓ (1).

iii) Rate would increase ✓ (1). Because moving air washes away layers of water vapour ✓ (1) immediately outside the leaf. This lowers humidity of air outside the leaf thus increasing the relative humidity difference (saturation deficit) between the inside and outside of the leaf.

14. A – Enamel ✓ (1)

C – Dentine ✓ (1)

E – Cement ✓ (1)

B – Gum ✓ (1)

D – Pulp cavity ✓ (1)

F –

b) A – it is made up of hard organic substance consisting of mineral salt crystals (calcium sulphate) and carbonate) bound together by keratin ✓ (1). It forms an efficient, hard biting surface.

D – Contains blood vessels provide nourishment for the dentine ✓ (1).

Nerve endings for sensibility of the tooth ✓ (1)

c) Regular brushing

- Avoiding very sugary food
- Proper exercise of the teeth by eating tough fibrous food e.g. carrots, maize and vegetables.
- Eating food rich in vitamin C
- Regular dental checkup

15. a) Prevent loss of blood ✓ (1)

- Prevent entry of disease causing micro-organism ✓ (1)

b) Enzymes – Thromboplastin ✓ (1)

- Thrombin ✓

Ion: Calcium ions (Ca^{2+}) ✓ (1)

c) Excess bleeding causes a decrease in blood volume ✓ (1) leading to reduction in the total number of circulating red blood cells ✓ (1) and hence a deficiency of oxygen supply ✓ (1) to tissues. There is also reduction of nutrients supply since some dissolved substances are lost.

Tissues also get dehydrated ✓ (1) reducing their metabolic activity.

d) Vit. K is necessary for the formation of a protein called prothrombin ✓ (1) in the liver, which is important factor in the blood clotting process.

16. a) To remove all starch from the leaves (To destarch the leaves) ✓ (1)

b) To absorb carbon (IV) Oxide ✓ (1)

c) Leaf A would be stained brown ✓ (1)

C – Would be stained blue – black ✓ (1)

d) Leaf A was deprived off carbon (IV) Oxide, ✓ (1) which prevented photosynthesis from taking place.

Leaf C had access to carbon (IV) Oxide; ✓ (1) photosynthesis took place.

17. A – Microvilli

C – Venule

B – Lacteal

D – Artevirole

b) To provide a large surface area for the digestion and absorption of food

c) F – is network of capillaries where soluble end products of digestion diffuse into the blood stream

d) It is very long and the inner lining is highly folded offering a large surface area for absorption.

- Its surface area is increased further by villi and microvilli.

- Its epithellum is very thin allowing soluble food materials to pass through faster.

- It is richly supplied with blood capillaries and lacteals for transport of absorbed food materials.

e) Vitamins (any)

Inorganic ions



18. Explanation ✓ (1)

1) Basal metabolism ✓ (1). This is the energy required to maintain life it includes the energy used to drive vital processes as blood circulation, breathing maintenance of body temp etc. or basal metabolic rate (BMR). This is the lowest level of energy production ✓ (1).

2) Sex ✓ (1) explanation ✓ (1)

Males require more energy than females because males are more muscliline than female.

Females have more fats males use more energy compared to females.

3) Body size ✓ (1) explanation ✓ (1)

Small bodies people have a small volume which leads to a large surface area to volume ratio.

Their bodies lose a lot of heat to the surrounding. They therefore require more energy than big bodied people who have small surface area to volume ratio.

4) Occupation/activity \checkmark (1) – manual workers require more energy than for example an office worker (any correct explanation by use of an example)

5) Age \checkmark (1) explanation \checkmark (1)

Young children have many actively dividing cells and they are physically active. Therefore their Basal metabolic rate is higher than that of adults.

