

OPENER EXAMINATION: TERM 1 2024
BIOLOGY
FORM 3 - MARKING SCHEME

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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.i) The second name which represents species should start with a small letter. ✓ (1)
 The two names should be underlined separately ✓ (1)
 ii) Because they do not belong to the same species. Only members of the same species can breed to give rise to offspring.
4. Total magnification = eye piece lens magnification X objective lens magnifications

$$\begin{aligned}
 200 &= 10 \times \text{obj. lens} \\
 &= 200/10 \\
 &= \times 20
 \end{aligned}$$

✓ (1)

✓ (1)

✓ (1)

5. a) Cell membrane/plasma membrane ✓ (1)
 b) A – Phospholipid 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.

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Z

The solution in tubing Z was more concentrated than in the beaker or Z is hypertonic $\sqrt{(\frac{1}{2})}$ to the solution in the beaker $\sqrt{}$. Water molecules moved from the beaker where there are more free water molecules than in the tubing Z. free water molecules move from the beaker to the rising tubing through osmosis.

- c) Uptake of water from the soil into the root hairs of plant roots $\sqrt{(2)}$.
- 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 biological 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 [Download this and other FREE revision materials from https://teacher.co.ke/notes](https://teacher.co.ke/notes)

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 Rej. Stomata alone Any
- Leaf fall
- 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)

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 helps 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)

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They can contract rhythmically throughout without fatigue

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

13. a) is the process by which food is chemically broken down to release energy

b)(i) $RQ = \frac{CO_2 \text{ produced}}{O_2 \text{ consumed}}$

$$= \frac{18}{26}$$

$$= 0.7$$

(ii) fat

c) plants; ethanol and CO₂

Animals; lactic acid

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 (Ca²⁺) ✓ (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 \checkmark (1) in the liver. Which is important factor in the blood clotting process?

16. Explanation \checkmark (1)

1) Basal metabolism \checkmark (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 \checkmark (1).

2) Sex \checkmark (1) explanation \checkmark (1)

Males require more energy than females because males are more multiline than female

3) Body size \checkmark (1) explanation \checkmark (1)

Small body's 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.

17) When the body temperature is lower the blood vessels in the skin constrict

(vasoconstriction).this reduce blood flow to the skin and more blood is stored in the spleen as an adaptation to loss less heat

When the body temperature is high the blood vessels in the skin dilate (vasodilation). This increase blood flow to the skin encouraging heat loss

18.

Name of part	Function
arm	Support body tube and stage

base	Provide firm and stable support
Body tube	Holds the eye piece and revolving nose piece
Course adjustment knob	Brings the image to a rough focus
Fine adjustment knob	Brings image to sharp focus
diaphragm	Regulates the amount of light passing through the condenser
condenser	Concentrate light onto stage
Eye piece lens	Magnification
revolving nose piece	For magnification
clip	Hold slide in position
Stage	Where specimen on a slide is placed
mirror	Reflects light

19. Inhalation

- external intercostal muscle contracts while internal intercostal muscle relax
- ribs move upward and outwards
- diaphragm which is dome shaped flattens by the contraction of the muscles
- volume of thoracic cavity increases while the pressure decreases
- atmospheric pressure being higher than the pressure of the thoracic cavity, force air to rush into the lungs through the nose and hence inflating the lungs.

Exhalation

- external intercostal muscles relax while internal intercostal muscles contracts
- ribs are pulled inward and downwards to their original position
- diaphragm muscles relax and regain its original dome-shape
- volume of the thoracic cavity decreases and the pressure increases
- air is forced out of the lungs through the air passages into the atmosphere