**MARKING GUIDE OF BIOLOGY MID TERM TEST S2**

1. a) Characteristics possessed by plants and animals: Both have mitochondria for respiration, Nucleic acids (DNA, RNA), both have nuclei, ribosomes…

b) Characteristics possessed by plants only: Presence of plastids, Presence of cellulose cell wall, Cells with regular shapes…

2. a)

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| **Life process** | **Meaning** |
| Reproduction | Producing fertile offspring |
| Growth | Getting larger or more developed |
| Movement | Changing the position of a part or all of the body |
| Sensitivity | Responding to the environment |

b) System → Organ → Tissue → Cell → Chromosome Gene Adaptation of a dicotyledonous leaf to its function: Development of many veins, Extension of leaves.

3. (a) Family: Hominidae

 Genus: Homo

 (b) This is a group of closely related organisms that can interbreed and produce fertile offspring.

4.

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| **Trophic level** | **Organism** |
| Herbivore | Periwinkle |
| Producer | Seaweed |
| Secondary consumer | Starfish, crab and octopus |
| Top carnivore | Seal, seagull |
| Primary consumer | Limpet, periwinkle |

5. a) A child needs a diet rich in proteins because they are involved in body growth. Proteins are also involved in protecting the child against infections: antibodies are proteins.

b) An elderly person needs proteins for repair and to replace dead and damaged cells.

c) A sugar cane cutter requires more starch than a school teacher because he uses more energy than a school teacher.

6.(a) Through the roots

(b) Because mineral salts are in the solution with water and the entry of water by osmosis is done together with entry of mineral salts by diffusion.

7. A. *Earthworm* → *(v) Skin capillaries*

1. *Amoeba* → *(iv) Cell membrane*
2. *Insects* → *(i) Tracheoles*
3. *Mammal* → *(ii) Alveoli*
4. *Fish* → *(iii) Gill lamellae*
5. *Frog* → *(ii) Alveoli (also they can use skin capillaries)*

8. a) (i) **Mitochondria:** production of energy in the form of ATP or cellular respiration.

**(ii)Chloroplasts:** involved in photosynthesis.

**(iii)Golgi apparatus:** secretion of cell products, production of lysosomes, maturation of proteins.

(iv)**ER:** transport of substances in the cell, protein synthesis, detoxification, lipid synthesis.

9. a. It should be moist; it should have a large surface area. Should be thin and well supplied with capillaries.

b. Nasal cavity → Trachea → Bronchi → Bronchioles → Air sacs

c. Alveoli

10. a. Photosynthesis is a metabolic process by which plants and other autotrophic organisms make their own food using water and carbon dioxide in presence of sunlight and chlorophyll.

b. Conditions necessary for photosynthesis: presence of water, carbon dioxide, suitable temperature, presence of chlorophyll or chloroplasts.

11.  **a)** Fishes have the following adaptations: presence of gills, presence of a swim bladder, and presence of fins.

1. Because gills are not adapted to make gaseous exchange in air. The gills will be damaged in air.

**SECTION B.**

12. (i) Chlorophyll

 (ii)Protein or amino acids

b) For photosynthesis, hydrolysis, support / turgidity, a medium of chemical reactions, temperature regulation, seed germination, transport of substances

c)Xylem and phloem

d)Transpiration, root pressure, capillary action, cohesion and adhesion of water molecules, osmosis.

13. (a) Enzymes are proteins that catalyze (i.e., increase the rates of) biochemical reactions. In enzymatic reactions, the molecules at the beginning of the process, called **substrates**, are converted into different molecules, called **products**.

(b)Characteristics of enzymes:

* **Enzymes are not destroyed by the reaction** they catalyze and so can be used again.
* **An enzyme can work in either direction.** Metabolic reactions are reversible and the direction in which they proceed depends on the relative amounts of substrate and products present. The reaction will proceed from left to right until equilibrium between substrate and products is reached.
* **Enzymes are inactivated by excessive heat**. This property of enzymes relates to the fact that they are proteins. The proteins (and therefore enzymes) are denatured at high temperatures. Few cells can tolerate temperatures higher than approximately 45°C.
* **Enzymes are sensitive to PH.** Every enzyme has its own range of PH in which it functions most efficiently. Most intracellular enzymes function best at or around neutral. Excessive acidity or alkalinity renders them inactive.
* **Enzymes are specific** in the reaction they catalyze, much more than inorganic catalysts. Normally, a given enzyme will catalyze only one reaction or type of reaction. However, the degree of specificity varies from one enzyme to another.
* **Enzymes lower the activation energy of reactions they catalyze**. The activation energy is the energy necessary for a reaction to get started.
* **Enzymes possess active sites where the reaction takes place.** These sites have specific shapes.
* All enzymes are globular proteins.

(b)Breakdown of stored organic substances such as starch, proteins and lipids into monomers such as glucose, amino acids and fatty acids to be used by the embryo during germination.

14. (a) Small intestines.

b) When bacteria enter in small intestine, they invade its epithelial lining. When bacteria die, they secret toxins that irritate intestine’s walls and this results into secretion of much water and salts that end up with diarrhoea.

1. Virus or protozoa
2. Lack of clean water, lack of hygiene, improper disposal of wastes, inadequate cooking utensils in order to get where to keep properly their food.
3. The phagocytes engulf bacteria and ingest them.

15. (a) There are three types of carbohydrates

**Monosaccharides:** These are the smallest of carbohydrates and are the building blocks for other carbohydrates. They are sweet, can crystallise and are highly soluble in water. They include; **glucose, galactose and fructose** as the common hexoses.

**Disaccharides:** These are formed by combining two monosaccharides in a condensation reaction which involves loss of water. They are also sweet, can crystallise and are highly soluble in water. There are main disaccharides which include the following;

**Maltose:** Formed by combining two glucose molecules. **Lactose:** Formed by combining glucose and galactose **Sucrose:** Formed by combining glucose and fructose

**Polysaccharides:** These are much bigger than the disaccharides. They are insoluble in water and are not sweet. They are bulky and are main storage organs in plants and animals.

They include:

**Starch:** which is formed from α-glucose. It is found in plants. **Cellulose:** composed of β-glucose. Found in animals and fungi. **Glycogen:** composed of α-glucose. Found in animals and fungi.

## Test for reducing sugars:

**Apparatus:** Test tubes, heat source, Benedict's solution, solution containing reducing sugars.Procedure:

Place 2cm3 of a solution containing reducing sugars in a test tube. Add 2cm3 of Benedict's solution and heat for 1 minute.

**Observation:** The colour of the solution turns from blue to green to yellow and finally brown.

**Conclusion:** Reducing sugars are present.

*16. a. (i)* ***Biosphere*** *is the place on Earth where life is possible.*

***(ii) Habitat*** *is the place where an organism lives.*

***(iii) Niche*** *is the role of the species in the ecosystem.*

***(iv)Producer:*** *is an organism that can make its own food.*

*b. (i)* 𝐴𝑠ℎ 𝑡𝑟𝑒𝑒 → 𝐶𝑎𝑡𝑒𝑟𝑝𝑖𝑙𝑙𝑎𝑟𝑠 → 𝑅𝑜𝑏𝑖𝑛𝑠 → 𝑂𝑤𝑙𝑠

(ii) 𝐴𝑠ℎ 𝑡𝑟𝑒𝑒 → 𝐸𝑎𝑟𝑡𝑤𝑜𝑟𝑚𝑠 → 𝑅𝑜𝑏𝑖𝑛𝑠 → 𝑂𝑤𝑙𝑠

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| Autotrophic organism | Ash tree |
| Secondary consumer | Robins, ladybirds |
| Omnivore | Robins |
| Carnivore | Owls |

**SECTION C:**

17. a) i) Reasons why water gathers in the hollowed portion of potato B:

The sugar present in the hollowed portion of potato form a more concentrated medium. It exerts an osmotic pressure on the potato cells and attract water from the potato within a hollowed portion (cavity). Water will move from the potato (hypotonic solution) to the sugar medium (hypertonic solution) increasing the water level in the hollow portion of the potato.

ii) Water does not gather in the hollowed portion of potato A and C because: The cells of potato A have equal concentrations.

Water does not enter in C because it is boiled; the heat kills the cells of C: therefore no osmosis because osmosis takes place only in living cells.

(iii) Potato A is a control experiment.

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