**BIOLOGY FORM 2**

1(a) Genetics

b) Biochemistry

c) Ecology

d) Entomology

2(a) -Enclose the cell contents

-Control or regulate entry and exit of substances in and out of the cell

(b)(I) Mitochandria

(ii) Chloroplasts

(iii) Smooth endoplasmic reticulum

3(a) Teeth

They cut and grind food into small pieces to increase the surface area for digestion and for easy swallowing.

(b) Saliva

- It contains water which is a medium for chemical reactions and acts as a solvent.

- It contains salivary amylase/ptyalin which digests starch to maltose

4) - Active transport needs energy while diffusion does not need energy

- In active transport, the movement of molecules is against the concentration gradient while in diffusion it is along the concentration gradient

- Active transport depends on the availability of oxygen for respiration while diffusion does not.

5(a) Light stage - grand

* Dark stage – stroma of the chloroplasts.

(b)(I) The rate of photosynthesis increases as carbon(IV) oxide concentration increases upto a certain level optimum level where other factors become limiting.

(iii) The rate of photosynthesis increases as light intensity increases, up to a certain level or optimum light intensity range when other limiting factors slows down the rate of photosynthesis.

6 A-Phloem: Transport of organic food substances from their sites of manufacture, especially the leaves to other parts of the plant.

B- Cambium:- Formation of new xylem and phloem tissues or responsible for secondary growth.

C- Xylem:- Transport of water and mineral salts from the roots to the leaves.

D- Epidermis:- Protects the inner, more delicate tissues from mechanical damage and from entry of pathogenic microorganisms

(b) Parenchyma cells

(c) Part C would be stained

(d) It is a dicot because of the following reasons:

- Parenchyma tissue is separated into cortex and pith

-Vascular bundles are arranged in a ring between the cortex and pith

-Vascular cambium is present

7(a)(i) 4% - 0.04% = 3.96%

(ii 21% - 4% = 17%

(b) - Inhaled air has a higher concentration (%) of oxygen than exhaled air. Some of the oxygen is used for respiration.

- Inhaled air has a lower concentration or percentage of carbon(IV) oxide than exhaled air. Carbon(IV) oxide is produced in respiration

- The concentration of nitrogen is the same in both inhaled and exhaled air. Nitrogen does not play any part in gaseous exchange and so its concentration does not change.

8(a) The cylinders were placed in a hypotonic solution ie. Low solute concentration than that of cell sap. The cells absorbed water by osmosis until they become turgid. Thus increase in cell size and firmness.

(b) Placing the cylinders in a juice extract of the pawpaw fruit/isotonic solution.

9(a) Cell wall, chloroplast and sap vacuole

(b) Chlorophyll – traps light energy and uses it to drive the synthesis of food materials.

(c) Cell sap; (i) stores salts and sugars

(ii) Helps to maintain an osmotic gradient which regulates movement of water in and out the cells.

(iii) Helps to regulate the shape and turgidity of the cell

(d) Cellulose

(e) In dim light. They move to the upper part of the cell in order to receive enough sunlight for photosynthesis.

10.(i) Fatty acids and glycerol

(b) - form part of the cell membrane

-Provide insulation of bodies of animals

-A source of metabolic water

- Provide energy in absence of carbohydrates.

(c) By boiling with a dilute acid like dilute hydrochloric acid.

11**a)** P – rings of chitin/ spiral bands **√ 1mk**

Q – tracheoles **√ 1mk**

**b)** Circular rings keep the trachea open when pressure is exerted inside the lumen is low **√ 1mk**

**c)** Carbon (IV) oxide is of high concentration in the muscle tissue therefore it diffuses from the tissues into the tracheoles and moves to the trachea and out through the spiracles into the atmosphere (3mks)

**d)** – the walls are thin and lack chitin for rapid diffusion of gases (1mk)

- Walls are moist to dissolve gases (1mk)

- They are highly branched to increase the surface area for gaseous exchange

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|  |  |
| --- | --- |
| Aerobic respiration | Anaerobic respiration |
| 1, Oxygen is necessary for the complete oxidation of the substrates | 1, Oxygen is no required and the substrate is not completely broken down lactic acid and alcohol are formed |
| 2. It is more efficient because it releases large amount of energy. One molecule of glucose gives 38ATP molecule | 2) It is inefficient because it releases less energy. One molecule of glucose gives 2 ATP  molecules |
| 3) Energy is released slowly in small amounts, in steps | 3) Energy is released faster over a short period |
| 4) The end products are water and carbon (IV) oxide, which diffuse out of the cells before they accumulate. | 4) The end products are alcohol in plants and lactic acid in animals and can accumulate fast to toxic levels. |
| 5) It takes place in the cytoplasm and mitochondria | 5) It takes places in the cytoplasm |

13(a) -Always moist to dissolve gases which diffuse in solution form

-Thin-walled/epithelium this is one cell thick to reduce the distance of molecules moves.

- Have a large surface area for maximum exchange of gases (Highly branched or highly folded to increase the surface area.

- Highly vascularised to maintain a sleep concentration gradient hence maximum gaseous exchange.

- Must be permeable to respiratory gases.

(b) Breathing occurs in two stages:

**Breathing in or inhalation or inspiration**

* External intercostals muscles contract while internal intercostal muscles relax.
* This causes lifting/raising of the ribcage upwards and outwards
* Muscles of diaphragm contract hence flattens
* The volume of the thoracic cavity increase and pressure decreases than the atmospheric pressure
* The higher air pressure in the atmospheric pressure forces air into the lungs
* The lungs inflates

**Breathing out or exhalation or expiration**

* External intercostal muscles relax, while internal intercostal muscles contract.
* This causes the ribcage to move downwards and inwards.
* The muscles of the diaphragm relax and the diaphragm assumes a dome shape.
* This makes the volume of the thoracic cavity to decrease while pressure increases than the atmospheric pressure
* Higher pressure in the thoracic cavity forces air out of lungs.
* The lungs deflate

14. (a) K – Root hair cell (2 mks)

L – Endodermis

(b) Elongated to increase area for absorption of water and mineral salts

15. (a) A – Vera Cava (1 mk)

B- Aorta

C- Left ventricle



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| --- | --- |
| A (artery) | B (vein) |
| Narrow lumen | Wide lumen |
| Thick muscular elastic walls | Thin less muscular elastic walls |
| Valves only at the base where it leaves the heart | Has valves at intervals throughout their length |
|  |  |

1. To generate enough pressure; in order to pump to all parts of the body to a longer distance. (2 mks)