**BIOLOGY PAPER ONE**

**FORM 4**

**OPENER EXAMINATION TERM 3, 2022**

**MARKING SCHEME**

1. Give a reason why using a sharp blade is necessary when sectioning during preparation of specimens for observation under the microscope. (1mk)

Avoid distortion of the specimen;

1. The following reaction may occur in a forward and backward direction



 a) Name the organelle where the above reaction occurs.

 (i) Forward direction (1mk)

Chloroplast;

 (ii) Backward direction (1mk)

Mitochondrion;

(b)Give one difference and one similarity for the two organelles named in (a) above (2mks)

Similarity — Both have a double membrane;

 Both have fluid filled cavity;

|  |  |
| --- | --- |
| Chloroplast | Mitochondrion |
| Has Grana | has Cristae; |
| Has fluid Stroma | Has fluid Matrix; |

3.Why is it important for plants to lose water into the atmosphere? (3mks)

- cool the plant;

- For uptake of water up the xylem vessel;

- enable mineral elements to be transported in the plant;

- Removal of excess water;

- maintain turgor pressure;

4.The chart below represents how respiratory gasses are transported in the human blood.

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1. Identify gas Y. (1mk)

Carbon (II) oxide;

1. Name the advantages that oxyhaemoglobin has over carboxyhaemoglobin. (2mks)

|  |  |
| --- | --- |
| Oxyhaemoglobin | Carboxyhaemoglobin |
| Unstable hence dissociates releasing oxygen to the tissues/ | Stable hence does not easily dissociate; |

5. The paddles of whales and the fins of fish adapt these organisms to aquatic habitats.

 a) Name the evolutionary process that may have given rise to these structures. (1mk)

 Convergent evolution;

 b) What is the name given to such structures? (1mk)

 Analogous structures;

 c) Give two examples of vestigial organs in man. (2mks)

 Coccyx; appendix; reduced ear muscles/nictating membrane/reduced body hair;

6.State one physiological and one structural difference between a cell wall and cell membrane. (2mks)

|  |  |  |
| --- | --- | --- |
|  | Cell wall | Cell membrane |
| Physiological | Fully permeable | Semipermeable; |
| Structural | Made of cellulose | Made of lipoprotein; |

7.Name the organelles that carry out the following functions (2mks)

1. Formation of spindle fibres

Centrioles

1. Osmoregulation

 Contractile vacuole

8.The diagram below shows part of alimentary canal of a mammal



1. Name the parts labeled A and C (2mks)

A - oesophagus /gullet (reject food pipe)

C - duodenum

1. State the function of the part labeled B. (1mk)

Temporally storage of feaces / undigested /indigestible materials

/Absorption of water;

9.Name the part of the chloroplast where the following reactions occur.

a) Carbon (IV) oxide fixation. (1mk)

 Stroma;

b) Photolysis. (1mk)

Grana;

10. Polydactyl is a genetic disorder in which people inherit an extra digit. Polydactyl is caused by a dominant allele (B). The table below describes the different genotypes for polydactyl.

1. Complete the table below by giving the correct genotype, alleles of each genotype and the expected number of fingers per hand. (4mks)

|  |  |  |
| --- | --- | --- |
| Genotype | Alleles | Expected number of digits per hand. |
| Homozygous dominant | BB | Six |
| Homozygous recessive | bb | five |
| Heterozygous. | Bb | six |

1. The table below shows results of marriages between various parents. Complete the table by writing the probability of each marriage producing a child with polydactyl. One has been done for you. (2mks)

|  |  |
| --- | --- |
| Parental genotypes. | Probability of child with polydactyl |
| Bb X BB | 1 |
| Bb X bb |  0.5/ 50%/ ½ ; |
| Bb X Bb | 0.75/ 75% / ¾ ; |

11.(a) What are the end-products of respiration in animals when there is sufficient oxygen supply?

 (3mks)

 Energy/heat;

 Carbon (iv) oxide;

 Water;

12. state two characteristics of visking tubing used in osmosis process? (2mks)

* Its semi-permeable;
* It’s a thin membrane;
* Its synthetic;

13. Explain the physiological process responsible for keeping the seedlings upright (3mks)

 Its due to osmosis; water is drawn into the cells; becoming turgid providing

 Mechanical support;

14. List down substances that depend on diffusion, to be exchanged across the placenta of a female

 Human being. (3mks)

 O2  gas (from the maternal blood to foetal blood)

 CO2 gas (from the foetal blood to maternal blood)’

 Some digested foods;

15(a) What is meant by the term seed dormancy? (1mk)

 A period (of rest) in which a seed performs its physiological processes slowly (and utilize little food);

(b) State any two external causes of seed dormancy (2mks)

* Low/freezing temperatures;
* Lack of appropriate light wavelength

16. Explain what is meant by the following terms?

1. Plasmolysed cell (2mks)

A plant cell that has lost water by osmosis; and has become flabby/ shrunk;

1. A crenated cell (2mks)

an animal cell that has lost water by osmosis; anad shrunk;

17. List down any two domestic applications of anaerobic respiration (2mks)

* Fermentation of dairy products yoghurt, sour milk etc
* Fermentation of porridge;
* Production of biogas;
* Preparation of sillage;
* Baking of cakes/bread;

18. State two processes is heat energy produced by respiration lost from human body? (2mks)

* Conduction
* Convection/sweating/perspiration;
* Radiation;
* urination
* Defaecation;

19.Account for the absence of glucose and proteins in the glomerular filtrate.

 (a) Glucose (1mk)

All glucose reabsorbed at proximal convoluted tubule;

 (b) Proteins (1mk)

Proteins not filtered into glomerular filtrate as molecules too large to pass through capillary pores;

20. Plants relatively have less waste to excrete than animals. Give two reasons to explain this observation.

 (2marks)

Plants reuse some of their waste products; Plants produce their waste products slowly compared to animals that produce slowly;

21. Homeostasis is defined as the maintenance of a stable internal environment in the body.

What is meant by expression ‘internal environment’? (1 mark)

Tissue fluid/ Intercellular fluid/ Interstitial fluid;] Acc. Surrounding of the body cells

22. Name one factor that is maintained at a relatively constant level in the body by the following organs.

 (2mks)

1. Liver

 Blood glucose (Reject: sugar) level;

1. Kidneys

 Osmotic pressure/ Water content/ Osmolarity of body fluids (Accept: blood and tissue fluid) Accept: pH of body fluids (Accept: blood and tissue fluid);

Reject: Osmoregulation

23.Explain two ways in which the trachea is adapted to perform its functions. (2marks)

Made up of rings of cartilage to ensure it does not collapse (or to keep it open always) during breathing. Also they enable the tubes to be stretched e.g. during coughing;

Hollow tube to allow passage of air into the lungs.

The incomplete rings (c-shaped) have gaps on the side facing the oesophagus which allow smooth swallowing;

The inner lining of the trachea has mucus to trap and filter micro-organisms and dust particles preventing them from entering the lungs;

The trachea is lined with cilia which beat in waves and move mucus and other foreign particles upwards into the pharynx;

24.The diagram below represent the reflex arc in human

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(a) Name the parts labelled P and S (2mks)

P-Dorsal root ganglion

S-grey matter

(b) State the function of the part labelled Q (1mk)

Part through which motor neuron leaves the spinal cord

(c) Name the fluid contained in part labelled R. (1mk)

Cerebrospinal fluid

25. state two classes of the classes of the phylum Arthropoda in which the body is divided into cephalothorax and abdomen. (2mks)

Arachnida

Crustacea

26.Briefly explain two adaptive features present in animal respiratory surfaces that are absent in plant respiratory surfaces. (2mks)

Highly vascularized for transport of respiratory gases;

thin epithelial lining to reduce diffusion distance;

27. State two external characteristics that distinguish mammals from other vertebrates (2mks)

Body covered with fur/hairs;

Has external ear/pinna;

28. State two functions of the choroids in the human eye. (2 marks)

Has numerous blood vessels to supply nourishment of the eye cells;

Has dark pigment to absorb stray light;

29. Explain the effect of temperature above 400C to the germinating seed. (4mks)

 The temperature would denature the respiratory enzymes; the stored food would

 Not be hydrolysed/broken down; leading no germination;

 Higher temperature would kill the embryo;

30. Examine the diagrams below and answer the questions that follow.



(a) Give the identity of bone shown in the diagram above (2marks)

 Cervical vertebra;

(b) Give **two** reasons for your answer in a(i) above ( 2marks)

 Presence of branched transverse processes;

 - Presence of vertebrarterial canals;

31. a) State two effects of dumping untreated sewage into a river. (2 marks)

leads to eutrophication, kills organisms in water;

 Changes the water PH, reduces amount of oxygen in water;

 Causes water borne diseases eg cholera;

 Reduces the quality of water for consuming;

32. What is the importance of the following in external fertilization?

a) Laying of many eggs (1 mark)

to increase chances of survival since the fertilized eggs could be attacked by predators or

 micro-organisms;

b) Mention two adaptations of human sperm to its function ( 2 marks)

* have large nucleus which contains haploid genetic material;
* Has an acrosome which contains lytic enzymes which dissolves the membrane of an ovum for

Penetration;

* Has a long tail which propel the sperm towards the ovum by its side-to-side movement;
* Has numerous mitochondria to provide the energy necessary for propulsion of the sperm towards the ovum;