**NAME \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ INDEX NO. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**SCHOOL \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ SIGNATURE \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ DATE \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**231/1**

**BIOLOGY**

**(THEORY)**

**PAPER 1**

**TIME: 2 HOURS**

**SET 5**

**FORM 4**

**INSTRUCTIONS TO CANDIDATES**

* Write your name, school and admission number in the spaces provided above.
* Sign and write date of examination in the spaces provided above.
* Answer **all** the questions in the spaces provided.
* Additional pages **must not** be inserted.
* Candidates may be penalized for false information and even wrong spellings of technical terms.
* This paper consists of **8** printed pages.
* Candidates should check to ensure that all pages are printed as indicated and no questions are missing.

**FOR OFFICIAL USE ONLY**

|  |  |  |
| --- | --- | --- |
| **Question** | **Maximum score** | **Candidate’s score** |
| **1 − 32** | **80** |  |

1. a) Explain the meaning of the term binomial nomenclature. (1 mark)

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b) Scientific name *Lantana camara* refers to a green herbaceous plant. Other related plants include, *Lantana trifoliate* and *Vitex trifoliate.* From the list identify the plants belonging to the same genus. (2 marks)

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1. Name cell structures that perform the following functions. (2 marks)
2. Controlling materials, entering and leaving the cell.

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1. Transporting cell secretions.

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1. A student estimated the diameter of a field of view to be 2.8mm. The diameter was occupied by four onion cells. Estimate in micrometers the diameter of onion cell. Show your working. (2 marks)

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1. The figure below illustrates a food web in a certain ecosystem.



From the food web:-

1. Draw the shortest food chain. (1 mark)

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. Identify the organisms with the highest.
2. Number of predators (1 mark)

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1. Biomass (1 mark)

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. Name the type of competition exhibited by the following relationship. (2 marks)
2. Second generation of tobacco plant and the parent plant.

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

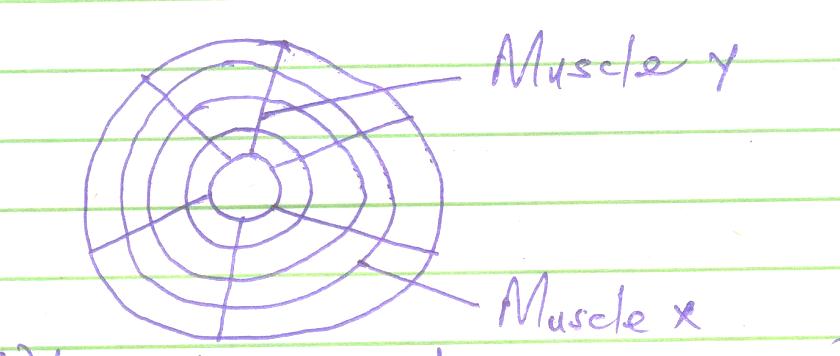
1. Different types of herbivores in an enclosed grass paddock.

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. Name the gamete cells that are produced by the ovaries in mammals. (1 mark)

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1. The diagram below shows the iris of a mammalian eye



**Muscle Y**

**Muscle X**

1. What happens to muscle Y and X when the eye focus at an object in bright light?
2. Muscle X (1 mark)

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1. Muscle Y (1 mark)

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. State how the following parts of a mammalian eye are adapted to their function.
2. Fovea (1 mark)

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1. Choroid (1 mark)

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1. State **three** ways in which *Ascaris lumbricoides* is adapted to living in its habitat. (3 marks)

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1. Name process through which nitrites are converted into nitrates. (1 mark)

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1. The quantity of urine passed per day was measured in four mammals; A, B, C and D of the same species in their natural habitats. The results were as shown below.



1. In what form is nitrogenous waste likely to be in organism D? Explain. (3 marks)

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. Name **one** kidney disease in humans. (1 mark)

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1. a) Define the following terms. (2 marks)
2. Divergent evolution

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1. Vestigial structures.

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b) State the role of continental drift in evolution. (2 marks)

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1. Explain the role of ecdysone hormone. (1 mark)

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1. a) What is reflex action? (1 mark)

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b) Give **three** components of a simple reflex arc. (3 marks)

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1. Where does gaseous exchange take place in terrestrial plants? (2 marks)

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1. a) Complete the following table. (3 marks)

|  |  |  |  |
| --- | --- | --- | --- |
|  | Gland | Hormone secreted | Effect of the hormone |
| i) | Thyroid |  |  |
| ii) |  | Androgen |  |
| iii) | Placenta |  |  |

b) Give **two** differences between endocrine and nervous systems. (2 marks)

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. Define the following terms as used in genetics.
2. Heterozygote (1 mark)

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1. Transgenics (1 mark)

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1. Explain why: (2 marks)
2. Wind pollinated flowers produce very high number of pollen grains.

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1. After 4 months of pregnancy, the ovaries of a woman may be removed without ending pregnancy.

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1. A DNA strand was found to have the base sequence as shown below.

**A – T – T – C**

1. What is the base sequence of the mRNA synthesized by the strand? (1 mark)

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. State **two** causes of chromosomal mutations. (2 marks)

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1. What is dental formula? (1 mark)

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1. In reference to leaves only, state **two** adaptations in each that adapt the following types of plants to their habitats.
2. Xerophytes (2 marks)

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. Hydrophytes (2 marks)

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1. Give **two** advantages of homoitherms over poikilotherms. (2 marks)

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1. Explain why it is advisable to breathe through the nose rather than the mouth in man. (2 marks)

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1. Name the valve which opens during:
2. Systole (1 mark)

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1. Diastole (1 mark)

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1. The table below shows the concentration of some mineral ions in the cell sap of root hairs and in soil water.

|  |  |  |
| --- | --- | --- |
| Mineral ion | Concentration in cell sap | Concentration in soil water |
| Magnesium | 75 | 115 |
| Nitrates | 126 | 47 |

1. Give physiological process through which magnesium ions uptake by the plant occurs. (1 mark)

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1. The plant was sprayed with a respiratory poison, State with a reason, the ions uptake which was affected. (3 marks)

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1. Name the type of vitamins that you would recommend for patients with the following symptoms.
2. Poor night vision (1 mark)

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1. Excessive bleeding after injury. (1 mark)

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1. Study the process below.

Amino acid + Amino acid Product B + Water

1. Name product B (1 mark)

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1. Which process is represented above? (1 mark)

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1. Give **two** products of light reaction of photosynthesis which are used in dark stage. (2 marks)

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1. Explain how the following factors affect the rate of transpiration. (4 marks)
2. Wind

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1. Sunken stomata

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1. Name the disease caused by the following microorganisms in man. (2 marks)
2. *Entamoeba hystolytica*

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1. *Bordetella pertusis*

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1. Students observed an animal with the following features.

* Dorsa-ventrally flattened body
* One pair of legs per segment
* Poison claws on the head

1. Name the class to which the animal belongs. (1 mark)

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1. State the mode of feeding of the animal. (1 mark)

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1. Distinguish between active and passive immunity. (2 marks)

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1. Explain the importance of the following during preparation of temporary slides. (2 marks)
2. Cutting thin sections

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1. Staining

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