**Name …………………………………………………. Index number ………………\…………**

 **Candidate’s signature ……………………….. Date ……………………………………………**

 **231/2**

 **BIOLOGY**

 **PAPER 2**

 **(THEORY)**

 **2 HOURS**

**SET 3**

**FORM 4**

**Instruction to candidates**

1. Write your name and index number in the spaces provided above.
2. Sign and write the date of examination in the spaces provided above**.**
3. This paper consist of **two** sections; **A** and **B.**
4. Answer all the questions in section A in the spaces provided.
5. In section B answer question 6 (compulsory) and either question 7 or 8 in the spaces provided after question 8.
6. This paper consist of 12 printed pages
7. Candidates should check the question paper to ascertain that all the pages are printed as indicated and that no questions are missing.

**For Examiner’s Use Only**

|  |  |  |  |
| --- | --- | --- | --- |
| Section | Questions | Maximum score | Candidate’s score |
| A | 1 | 12 |  |
| 2 | 8 |  |
| 3 | 8 |  |
| 4 | 10 |  |
| 5 | 11 |  |
| B | 6 | 20 |  |
| 7 | 20 |  |
| 8 | 20 |  |
|  | Total Score | 80 |  |

 **SECTION A (40 marks)**

 **Answer all the questions in this section**.

1. The diagram below shows how gaseous exchange occurs across the gills of fish.



1. From the diagram above, water and blood flow in opposite direction.
2. Give the term used to describe this type of flow ( 1 mark)

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1. Explain the significance of this type of flow. (2 marks)

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1. Name two organs in human beings that display the flow system named in (a) (i) above. (2mks)

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1. Explain why the gills of a fish are:
2. Highly vascularised. (1 mark)

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1. Thin walled. (1 mark)

…………………………………………………………………………………………………………………………………………………………………..

1. Moist. (1 mark)

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1. How are the gill rakers adapted to perform their functions? (1 mark)

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1. Explain how the tracheole system in insects is adapted for gaseous exchange.

 (3 marks)

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1. The figure below shows a stem of a plant growing round a tree trunk. Study it and answer the questions that follow.



1. What is the name of the response which causes such a twisted growth? (1 mark)

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1. Explain how the twisting growth occurs. (3 marks)

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1. Explain the adaptations of the leaves if the plant is autotrophic. (4 marks)

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1. (a) What is meant by the term sex – linkage? (2 marks)

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(b) name two sex – linked traits in humans. (2 Marks)

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(c) In Drosophila melanogaster, the inheritance of eye colour is sex – linked. The gene for Red eye is dominant. A cross was made between a homozygous Red-eyed female and a white – eyed male. Work out the phenotypic ratio of F1 generation. (Use R to represent the gene for red eyes). (4 marks)

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1. A student set up an experiment to investigate a certain process. Study it and answer the questions that follow. The cubes are of the same size an shape.



1. Name the process being investigated. (1 mark)

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1. State 2 roles played by the process named in (a) above in plants (2 marks)

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1. What observations would be made after 40 minutes? (3 marks)

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1. Account for your observation. (3 marks)

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1. Suggest a control for this experiment. (1 mark)

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1. (a) Give the difference between the following structures in wind and insect pollinated flowers.
2. Anthers (2 marks)

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1. Pollen grain (2 marks) ……………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………...
2. Stigma (2marks)

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 (b) State the necessity for cross pollination. (2 marks)

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1. Briefly explain how a seed is formed after the fertilization of ovule. (3 marks)

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 **SECTION B (40 Marks)**

**Answer question 6 (compulsory), and either question 7 or 8.**

1. During germination and growth of cereal, dry weight of endosperm, embryo and total dry weight were determined at 2 days intervals and results recorded as shown below.

|  |  |  |  |
| --- | --- | --- | --- |
| Time after planting (days) | Dry weight of endosperm(mg) | Dry weight of embryo (mg) | Total dry weight (mg) |
| 0 | 43 | 2 | 45 |
| 2 | 40 | 2 | 42 |
| 4 | 33 | 7 | 40 |
| 6 | 20 | 17 | 37 |
| 8 | 10 | 25 | 35 |
| 10 | 6 | 33 | 39 |

1. Using same axes, draw graphs of dry weight of endosperm, embryo and total dry weight against time. (7 marks)
2. What was the total dry weight on 5th day? (1 mark)

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1. Account for the:
2. Decrease in dry weight of endosperm from day 0 to 10. (2 marks)

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1. Increase in dry weight of embryo from day 0 to 10th day. (2 marks)

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1. Decrease in total dry weight from day 0 to 8. (1 mark)

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1. Increase in total dry weight after the 8th day. (1 mark)

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1. State two factors within the seed and two outside the seed that causes dormancy.
2. Within the seed (2 marks)

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1. Outside the seed (2 marks)

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1. What is the characteristics of meristematic cells? (2 marks)

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1. How is the mammalian eye adapted to its function? (20 marks)
2. How is the mammalian intestine adapted to its functions? (20 marks)

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