**Name: …………………………………………………… Index No: …………………….…..……………**

School: ………………………………………………….. Date: ……………………………………………

231/2

**BIOLOGY**

Paper 2

**Time: 2 Hours**

**FORM 4**

**INSTRUCTIONS TO CANDIDATES**

*This paper consists of two sections A and B. All the questions in section A are compulsory. In the section B, answer question 6 (compulsory) and either question 7 or 8 in the spaces provided after question 8.*

|  |  |  |  |
| --- | --- | --- | --- |
| Section | Questions | Max Score | Candidates score |
| A | 1  2  3  4  5 | 8  8  8  8  8 |  |
| B | 6 | 20 |  |
| 7 | 20 |  |
| 8 | 20 |  |
| Total Marks 80 | |  |

1. (a) Name the organelles that perform each of the following functions in a cell. (4 marks)

(i) Synthesis of proteins

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(ii) Transport cell secretions

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(iii) Destroy old and worn out organelles or even the entire cell.

……………………………………………………………………………………………………………………………………………………………………………………………………………………………… (iv) Package and transport glycoproteins.

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(b) Using a light microscope, a student counted 55 cells across a field of view whose diameter was 6000μm.

Calculate the average length of the cells. Show your working. (3 marks)

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(c) Why is it recommended to keep the stage of the microscope dry. (1 mark)

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1. In a certain plant species which is normally green, a recessive gene for colour (n) causes the plant to be white when present in a homozygous state. Such plants die at early age. In heterozygous state, the plants are pale green in colour but grow to maturity.
2. Suggest a reason for the early death of plants with homozygous recessive gene. (2 marks)

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1. If a normal green plant was crossed with a pale green plant, what would be the genotype of the F1 generation? (Show your working) (3 marks)

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1. If seeds from the heterozygous plants were planted and the resulting plants allowed to self pollinate. Workout the phenotypic ratio of the plants that would grow to maturity. (2 marks)

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1. Give an explanation for occurrence of the pale green colour in heterozygous plants. (1 mark)

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1. The diagram below represents a state in cell division. Study it and answer the questions below.

A

B

C

1. Name the stage of cell division illustrated in the diagram above. (1 mark)

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1. Name the parts labelled A, B and C (3 marks)

A

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B

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C

………………………………………………………………………………………………………………

1. State **THREE** differences between mitosis and meiosis. (3 marks)

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| --- | --- | --- |
|  | Mitosis | Meiosis |
| (i) |  |  |
| (ii) |  |  |
| (iii) |  |  |

1. Name the process during which the exchange of genetic materials occur at prophase 1 of meiosis.

(1 mark)

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1. (a) Describe how the quadrant method can be used to estimate the population of various species of

plants in a given habitat. (3 marks)

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(b) To estimate the population size of beetles in an ecosystem, traps were laid at random. 400 beetles

were caught, marked and released back into the ecosystem. A week later traps were laid again and

374 beetles were caught. Out of the 374 beettles, 80 were found to have been marked.

(i) Calculate the population size of the beetles in the ecosystem. (2 marks)

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(ii) State **TWO** assumptions that were made during the investigation. (2 marks)

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(c) What is the name given to this method of estimating the population size? (1 mark)

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1. The table below shows the approximate distribution of blood groups in a sample of 100 people in a population.

|  |  |  |  |
| --- | --- | --- | --- |
| **Blood group** | **Frequency** | **Rhesus +ve** | **Rhesus -ve** |
| **A** | **26** | **22** | **4** |
| **B** | **20** | **18** | **2** |
| **AB** | **4** | **3** | **1** |
| **O** | **50** | **43** | **8** |

1. Calculate the percentage of Rhesus negative (Rh-ve) individuals in the population? (1 mark)

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1. Account for

(i) The large number of blood group O individuals in a population. (2 marks)

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(ii) The small number of individuals with blood group AB. (2 marks)

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1. The diagram below represents a blood smear on a glass slide.

A

B

C

(i) State the importance of structure C being large numbers in the blood smear. (1 mark)

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(ii) Give a reason why structure C would be found in large numbers in high altitude than in low

altitude. (1 mark)

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(iii) Name the process by which structure A would engulf structure B. (1 mark)

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**SECTION B: 40 (MARKS)**

***Answer question 6 (Compulsory) and either question 7 or 8 in the spaces provided after question 8.***

1. An experiment was carried out to investigate transpiration and absorption of water in sunflower plants in their natural environment with adequate supply of water. The amount of water was determined in two hour intervals. The results are shown in the table below.

|  |  |  |
| --- | --- | --- |
|  | **Amount of water in grammes** | |
| **Time of day** | **Transpiration** | **Absorption** |
| 1100-1300  1300-1500  1500-1700  1700-1900  1900-2100  2100-2300  2300-0100  0100- 0300 | 33  45  52  46  25  16  08  04 | 20  30  42  46  32  20  15  11 |
|  |  |  |

1. Using the same axes, plot graphs to show transpiration and absorption of water in grammes against time of the day. (7 marks)



1. At what time of the day was the amount of water the same for transpiration and absorption. (1 Mark)

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1. Account for the shape of the graph of

(i) Transpiration (3marks)

………………………………………………………………………………………………………………………………………………………………………………………………………………………………

(ii) Absorption (3marks)

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1. What would happen to transpiration and absorption of water if the experiment was continued till 0050 hours. (2 marks)

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1. Name two factors that may affect transpiration and absorption at any given time. (2 marks)

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1. Explain how the factors you named in (e) above affect transpiration. (2marks)

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1. Describe the

(i) Process of inhalation in mammals (10 marks)

(ii) Mechanism of opening and closing of stomata (10 marks)

1. How is the human eye adapted to its functions (20 marks)

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