P530/2
BIOLOGY
(Theory)
Paper 2
2½ hrs

STANDARD HIGH SCHOOL ZZANA

Uganda Advanced Certificate of Education

Biology

(Theory)

Paper 2

2 hours 30 minutes

INSTRUCTIONS TO CANDIDATES

This paper consists of **two** *sections;* **A** *and* **B**.

Answer question **one** *in section* **A**, *plus* **three** *other questions from section* **B**.

Any additional question(s) answered will not be marked.

Candidates are advised to read the questions carefully, organize their answers and present them precisely and logically.

Illustrate with well - labelled diagrams where necessary.

Turn Over

SECTION A: (40 marks)

1. An experiment was carried out to estimate the number of butterflies in an open field. The results of the experiment are shown in the table below.

Sample	Number of butterflies in a sample	Cumulative sample size
1	150	
2	90	
3	55	
4	30	
5	24	

(a) (i) Copy and complete the table above by calculating the cumulative number of butterflies captured. (2½ marks)

(ii) Plot a graph to represent the data in your table. (07 marks)

(b) (i) From your graph estimate the number of butterflies in the field. (½ mark)

(ii) Explain how you arrived at your answer in (b) (i) above. (02 marks)

(c) (i) Suggest the method used to estimate the number of flies in the field above. (00 marks

(ii) State **one** other method you would use to estimate the population size of flies in the field. Give reasons for your answer. (01 mark)

(d) Another experiment was carried out to investigate some of the factors which influence flowering of a long day plant species and onset of germination of seeds of the same plant species. The plant and two seed samples were treated as follows. The plant and seed sample 1 were separately subjected to a short day illumination cycle of 4 hours light period and 20 hours dark period table below shows the percentage seed germination for each seed sample.

Time / days	Percentage germination	
	Long day illuminated seed sample	**Short day illuminated seed sample**
0	0	0
2	04	4
4	58	22
6	79	40
8	89	48
10	98	57

Explain the effect;

(i) Exposing the plant to the experimental conditions above on the following of the plant. (10 marks)

(ii) Varying illumination cycles in experiment 1 on germination of seeds. (12 marks)

SECTION B: (60 marks)

Answer any **three** *questions from this section.*

2. (a) Outline the role of calcium ions in the process of muscle contraction. (07 marks)

(b) Describe the causes of fatigue in skeletal muscle. (04 marks)

(c) (i) Explain why there is an increase in the rate of respiration of a muscle when it contracts. (03 marks)

(ii) Briefly describe the structure of a compact bone. (06 marks)

3. (a) What is meant by the following phenomena?

(i) Allopatric speciation, (03 marks)

(ii) Sympatric speciation, (03 marks)

Turn Over

(b) How many niche differentiation lead to speciation? (09 marks)

(c) Explain why new species are more often realized by polyploidy in plants than in animals. (05 marks)

4. (a) Distinguish between photo respiration and respiration. (03 marks)

(b) Outline the main steps involved in the dark stage of photosynthesis in C_4 plants. (14 marks)

(c) Give **four** advantages of C_4 plants over C_3 plants. (04 marks)

5. (a) Briefly describe the various hypotheses that have been proposed to explain translocation in angiosperms. (16 marks)

(b) For each hypothesis, state the limitations that might exist. (04 marks)

6. (a) Show how the variation of the glomeruli in teleost fish reflects the level of water retention in their bodies in relation to their habitat. (14 marks)

(b) Describe the osmoregulatory survival of the migratory fish. (06 marks)

END