P530/2
BIOLOGY
(Theory)
Paper 2
AUGUST, 2025
$2\frac{1}{2}$ *hours*

JINJA JOINT EXAMINATIONS BOARD

Uganda Advanced Certificate of Education

MOCK EXAMINATIONS – AUGUST, 2025

BIOLOGY

(THEORY)

Paper 2

2 hours 30 minutes

INSTRUCTIONS TO CANDIDATES

Answer question ONE in section A plus three others from section B.

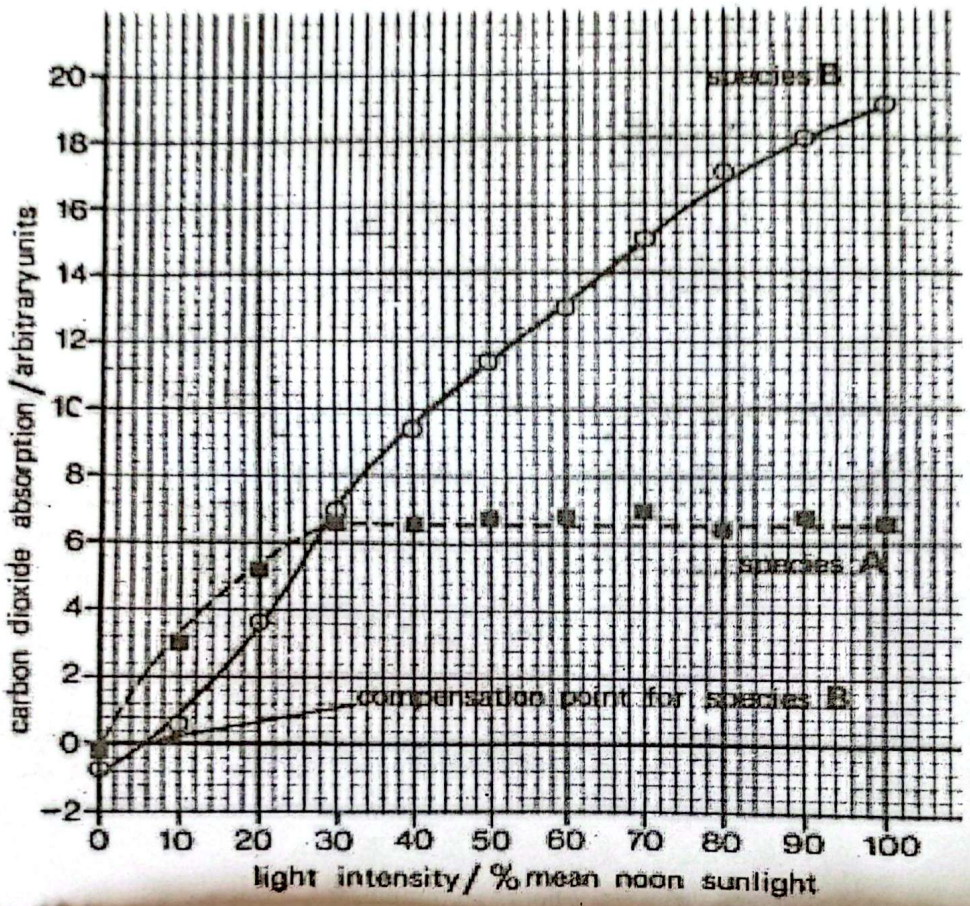
Candidates are advised to read questions carefully, organize their answers and present them precisely and logically.

Illustrate, whenever necessary, with well labelled diagrams.

SECTION A: (40MARKS)

(Question 1 is compulsory)

1. In an investigation about two plant species that grow naturally in different habitats, the photosynthetic rate in terms of carbon dioxide absorption was determined over a wide range of light intensities. The results of the investigation are shown in the figure below.



(a) Compare the rate of carbon dioxide absorption in plant species A and plant species B. (07 marks)

(b) Account for the variation in the rate of carbon dioxide absorption in;

(i) Plant species A. (06 marks)

(ii) Plant species B. (07 marks)

(c) Predict with reasons what would happen if both plant species A and B were grown in the same habitat. (08 marks)

(d) Explain how each of the following factors can be limiting in photosynthesis.
(i) Temperature. (04 marks)
(ii) Carbon dioxide concentration. (04 marks)

(e) Explain the role of water molecules in photosynthesis. (04 marks)

SECTION B: (60 MARKS)

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

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

2. (a) Discuss the genetic basis and evolutionary significance of each of the following;
(i) Sickle cell anaemia. (05 marks)
(ii) Heavy-metal tolerance. (05 marks)

(b) In Drosophila melanogaster the genes for body and eye colour are sex-linked, the allele for grey body is dominant over that of yellow body and that of red eyes is dominant over that of white eyes.
A wild type male (grey body and red eyed) was crossed with a yellow-bodied, white eyed female and produced males with yellow bodies and white eyes and females with grey bodies and red eyes.
When these flies were interbred the offsprings consisted of 1002 flies with grey bodies and red eyes, 1004 flies with yellow bodies and white eyes, 15 flies with grey bodies and white eyes and 16 flies with yellow bodies and red eyes.
(i) Using well defined genetic symbols the flies produced in the F1 and F2. (08 marks)
(ii) Calculate the crossover value between the gene for grey body and red eyes. (02 marks)

3. (a) Explain the mechanisms by which mammals get rid of different non-nitrogenous wastes out of their bodies. (10 marks)

(b) Describe how each of the following occur;
(i) Osmoregulation in halophytes. (04 marks)
(ii) Mechanical osmoregulation in hydrophytes. (06 marks)

4. (a) Compare the factors that control ventilation rate with those controlling heart rate in humans. (08 marks)

(b) Describe the respiratory metabolism of each of the following substrates;
(i) Glycerol. (07 marks)
(ii) Proteins. (05 marks)

5. (a) Explain how each of the following inhibit impulse transmission across the synapse.
   (i) Transmitter substances. (06 marks)
   (ii) Drugs (04 marks)
   (iii) Concentration of mineral ions. (03 marks)
   (b) Describe the functions of synapses in impulse transmission. (07 marks)

6. (a) Explain how increased activity;
   (i) Affects the breathing rate. (07 marks)
   (ii) Oxygen dissociation curve. (06 marks)
   (b) Describe the role of changes in pH played in stomatal movement. (07 marks)

 End