

**P530/2**  
**BIOLOGY**  
**Paper 2**  
**Nov./Dec. 2003**  
2 hours 30 minutes



**UGANDA NATIONAL EXAMINATIONS BOARD**

**Uganda Advanced Certificate of Education**

**BIOLOGY**  
**(THEORY)**

**Paper 2**

2 hours 30 minutes

**INSTRUCTIONS:**

*Answer Question 1 in Section A plus three others from Section B.*

## SECTION A ( 40 marks )

1. In an experiment to determine the factors affecting photosynthesis, seedlings of a plant were divided into two groups and grown under different light intensities. One group of seedlings was grown at a constant high light intensity (25 arbitrary units), and another group grown at a constant low light intensity (3 arbitrary units). When the plants were mature, their apparent rates of photosynthesis in milligrams of oxygen released per unit leaf area per hour, were measured over a range of different light intensities.

Fig.1 shows the results of the experiment.

In addition, some characteristics of the two groups of plants were recorded as indicated in Table 1.

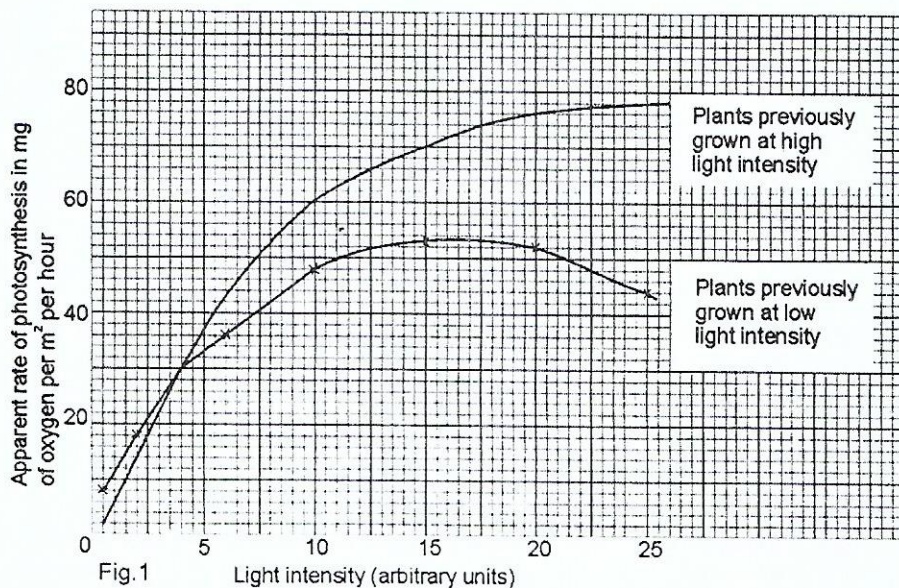


Table 1

Group of plants	Characteristics
Plants grown at high light intensity	Big ,dark green leaves with short internodes.
Plants grown at low light intensity	Small , pale yellow leaves with long internodes.

- (a) From the graph, state the
- (i) differences in the effect of light intensity on the two groups of plants. ( 8 marks )
  - (ii) similarities in the effect of light intensity on the two groups of plants. ( 3 marks )
- (b) Suggest explanations for the differences you have stated in a(i). ( 8 marks )
- (c) Explain the pattern of the curve for plants grown in low light intensity. ( 6 marks )
- (d) Explain the observed characteristics of the two groups of plants as indicated in Table 1. ( 9 marks )
- (e) Suggest why:
- (i) seedlings of the same plant were used in the experiment. ( 2 marks )
  - (ii) the rate of release of oxygen was used to measure the rate of photosynthesis. ( 2 marks )
- (f) Name two factors that may limit the rate of photosynthesis of plants previously grown in high light intensity, if subjected to light intensity above 25 arbitrary units. ( 2 marks )

**SECTION B : ( 60 marks )**

2. (a) Describe mechanisms which promote out-breeding in monoecious plants. ( 12 marks )
- (b) Explain how sexual reproduction may cause variation. ( 8 marks )
3. (a) Describe the structural and the biochemical adaptations of a mammalian red blood cell for its functions. (10 marks)
- (b) (i) How does variation in pH of mammalian blood affect the ability of haemoglobin to associate with oxygen? ( 5 marks )
- (ii) What is the physiological significance of these effects in b(i)? ( 5 marks )

4. (a) What is the rôle of the apical meristem in root growth? ( 7 marks )
- (b) Describe the formation of secondary tissues in cotyledonous plants. ( 13 marks )
5. (a) Describe the trend of succession that would take place on a bare rock. (10 marks)
- (b) Outline the flow of energy in the climax community described in (a). (10 marks)
6. (a) What are the qualities of a respiratory surface? ( 4 marks )
- (b) How is each of the following organisms adapted for efficient gaseous exchange ?
- (i) An insect. ( 7 marks )
- (ii) A terrestrial flowering plant. ( 6 marks )
- (iii) An amoeba. ( 3 marks )