INTERNATIONAL BACCALAUREATE

BIOLOGY

Subsidiary Level

Thursday 4 May 1995 (afternoon)

Paper 2   45 minutes

This examination paper consists of 2 questions.

The maximum mark for each question is 10.

The maximum mark for this paper is 20.

This examination paper consists of 5 pages.

INSTRUCTIONS TO CANDIDATES

Write your candidate reference number in this box:

DO NOT open this examination paper until instructed to do so.

Answer BOTH questions in the spaces provided in this answer book.

EXAMINATION MATERIALS

Required/Essential:

      Electronic calculator (programmable and/or graphic display calculators are not allowed)

Allowed/Optional:

      A simple translating dictionary for candidates not working in their own language

Question 1.

An experiment was carried out to study the effect of varying the amount of Carbon Dioxide on the growth of different tree species in an enclosed area of rain forest.

Firstly, the biomass of the different species was determined under a natural Carbon Dioxide concentration of 350 ppm (parts per million).

The same area was then exposed to a concentration of 700 ppm Carbon Dioxide for 120 days. After this time the biomass was again determined. The biomass of each species was expressed as a **percentage of the total biomass** for the area under investigation.

The results of this investigation are summarised in the table below.

Species of plant	% Total biomass (at 350 ppm)	% Total biomass (at 700 ppm)
Trichospermum	14	21
Senna	49	33
Myriocarpa	3	3
Piper	11	17
Cecropia	23	26

(a) Define the term 'biomass'.

[2 marks]

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(b) Describe the effect of the increased Carbon Dioxide concentration on the biomass of **each of the five** species of plants.

[3 marks]

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(This question continues on page 3)

(*Question 1 continued*)

(c) In general, what might happen to this plant community if the Carbon Dioxide concentration remained high for a very long time (for example, the next 1000 **years**)? *[1 mark]*

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(d) If the experiment at 700 ppm were to be continued for 360 **days**, assuming that all other factors remain constant; what would be the **variation in % total biomass** of *Tricospermum* and *Senna*, after that period? Show your reasoning. *[2 marks]*

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(e) If the conditions remain the same for a longer period, which species is the most likely to become dominant and which one extinct? *[2 marks]*

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Question 2.

Deaf-mutism is a rare condition, where a person can neither speak nor hear. It is believed to be associated with two autosomal unlinked genes. The genes have the symbols **D** and **E**. There are dominant (**D**, **E**) and recessive (**d**, **e**) alleles at each locus. A person must have at least **one 'copy' of each dominant allele** to avoid deaf-mutism.

(a) Using the symbols given above, write all possible genotypes for individuals phenotypically unaffected (normal). *[3 marks]*

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(b) Using the same symbols represent the genotype of a double heterozygote. *[1 mark]*

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(c) Construct a Punnett Square showing all the possible genotypes that can result from a man and a woman, both of whom are double heterozygotes. *[3 marks]*

(d) From the above, what is the ratio of unaffected people to deaf-mutes? *[1 mark]*

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(*Question 2 continued*)

    (e) A child has a double homozygous unaffected father and a deaf-mute mother. What is the probability that this child is deaf-mute?

        Show how you arrive at your answer in a clear and logical way.   *[2 marks]*

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