

INTERNATIONAL BACCALAUREATE

BIOLOGY

Subsidiary Level

Thursday 9 May 1991 (morning)

Paper 3

1 hour 30 minutes

ANSWER SECTIONS I AND II

SECTION I CORE TOPICS

INSTRUCTIONS: Answer TWO questions from this Section.

SECTION II OPTIONS

INSTRUCTIONS: Answer ONE question from this Section, chosen from the options you have studied.

*Each question in Section II carries the same number of marks. The number of marks awarded for each part of each answer is indicated thus: [*italic number*] e.g. [6]. The total marks awarded for each question is [30].*

Write your candidate reference number at the top of each answer sheet used.

SECTION 1 (CORE)

Choose TWO questions from this Section.

You are advised to spend no longer than 11 minutes on each question you answer in this Section.

I-1. (a) Complete the following table

[2 marks]

Enzymes	Substrate	Products
...	Butter (Lipids)	...
...	...	Polypeptides and amino acids

(b) State two factors capable of affecting enzyme activity.

[1 mark]

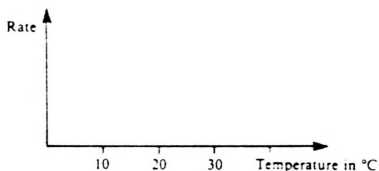
(c) Briefly explain the mechanisms by which the factors you mentioned in part (b) affected enzyme activity.

[2 marks]

I-2. Experiments were performed by Blackman in 1905 in which the rate of photosynthesis at various light intensities and temperature was measured. For each of the experiments described below make a sketch graph of the expected results.

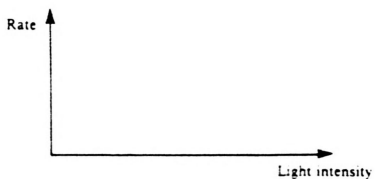
(a) An experiment with a range of temperatures between 0 °C and of 40 °C at constant high light intensity.

[1 mark]

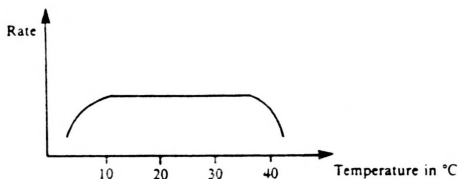


(b) An experiment for a range of light intensities from a minimum to a higher level, at a constant temperature of 30 °C.

[1 mark]



- (c) Blackman also carried out a third experiment in which the temperature moved between 0 °C to 40 °C but at a constant low light intensity. The graph he obtained looked like this:



Using the results from all 3 experiments, what deductions can be made about the process of photosynthesis? Explain your reasoning.

[3 marks]

- I-3. (a) How is it demonstrated that chlorophyll is necessary for photosynthesis?

[1 mark]

- (b) How is it demonstrated that light is necessary for photosynthesis?

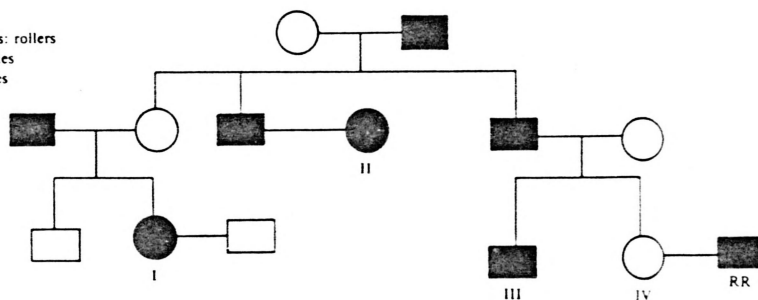
[1 mark]

- (c) Briefly state how photosynthesis and respiration differ and compare, with respect to energy and to gaseous exchanges.

[3 marks]

- I-4. The ability in man to roll the tongue is governed by the presence of a dominant allele R. The recessive allele is r. The presence of these alleles is shown in the pedigree chart below.

Black symbols: rollers
Circles: females
Squares: males



- (a) Person IV marries a person of genotype RR. What are the chances of their children being tongue rollers? Briefly explain your answer.

[1 mark]

- (b) Use appropriate symbols to show the genotype possible for children arising from the marriage of person I.

[1 mark]

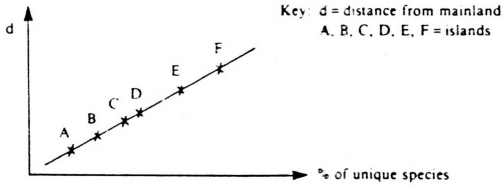
- (c) Show the genotypes of children resulting from the marriage of person III to a person of identical genotype.

[2 marks]

- (d) Name the law ruling this kind of inheritance.

[1 mark]

I-5. The graph below shows the percentage of finch species which are unique to some of the Galapagos islands.



(a) What conclusion would a biologist draw from this graph? [1 mark]

Suggest an explanation for this conclusion. [2 marks]

(b) The study revealed that one of the finch species found on Santa Cruz (point B on the graph) closely resembled one of the species of Genovesa (point F on the graph). Suggest **one** way in which scientists could discover if these finches were simply varieties of the same species, or if they were in fact members of two different species. [2 marks]

I-6. (a) Distinguish between parasitism and symbiosis. [2 marks]

(b) Give one example of each association. [2 marks]

(c) What would you consider a well adjusted association in a case of parasitism? [1 mark]

SECTION II (OPTIONS)

Choose ONE question from this Section.

You are advised to make your choice from the options you have studied.

You are advised to spend no longer than 68 minutes on the question you answer in this Section.

- II-1. Discuss the biological mechanisms [15] and the human actions [15] that prevent the entry of microorganisms into the human body.
- II-2. Discuss the work on behaviour of Ivan Pavlov [15] and Karl von Frisch [15]. Distinguish between the kind of behaviour involved in the work of each of these scientists.
- II-3. Outline the hypotheses [4] and describe with the aid of a diagram [5] the experiments performed by Meselson and Stahl [9] that resolved the 'conservative versus the semi-conservative replication of DNA' controversy. When does DNA replication take place in a eukaryotic cell? [2]. With the aid of a graph [6], explain what happens to the DNA content during the cell cycle of an eukaryotic cell, [4].
- II-4. With the aid of a labelled diagram, describe the structure of a dicotyledonous leaf [12]. Discuss how the structure relates to
- (a) gas exchange [6].
 - (b) water exchange [6].
 - (c) light utilization [6].
- II-5. What do you understand by 'alternation of generations'? [6]. By means of appropriate examples and labelled diagrams show how this concept can be applied to the life cycles of mosses and ferns [12×2].
- II-6. Describe an experiment to show the effect upon growth rate of a named microorganism of two of the following: nutrient supply, temperature, pH, oxygen availability [8×2]. What results would you expect from the experiment and how would you explain them? [7×2].
- II-7. How has fossil evidence been used to produce descriptions of *Australopithecus*, *Homo erectus* and *Homo habilis*? [15]. What relationships are thought to exist between these species? [15].
- II-8. What is a dominant species [3]? What is a community [4]? What is the importance of a dominant species in a community [11]? Describe how the ecological project you have carried out illustrates your answer [12].
- II-9. Food preservation techniques have changed over a long period of history. Explain how these techniques have altered by comparing and contrasting methods of salting, drying and pickling with more modern methods of canning, freezing and irradiating [18]. Outline and explain the underlying principles of how they all work, producing a basic classification of preserving techniques [4]. Choose another method of food preservation and classify this method using your system [8].
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