

INTERNATIONAL BACCALAUREATE

BIOLOGY

Subsidiary Level

Paper 3

Tuesday, 15 May 1990 (morning)

1½ hours

ANSWER SECTIONS I AND II

Section I CORE TOPICS

INSTRUCTIONS: Answer ONE question from this section.

Section II OPTIONS

INSTRUCTIONS: Answer TWO questions from this section, chosen from two different options. (You must not choose your two questions from both Option 4a and Option 4b.)

Each question carries the same number of marks. The number of marks awarded for each part of each answer is indicated thus: [italic number] eg. [6]. The total marks awarded for each question is [20].

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

Section I (CORE TOPICS)

Answer one of the following 5 questions.

- I-1 Draw a large, clearly labelled, diagram to show the structure of the human heart, [10]. Explain why it contracts and the nervous and hormonal mechanisms which vary the action of the heart to suit changing body requirements, [10].
- I-2 Explain the cell membrane structure, [4]. Mentioning examples, discuss the mechanisms by which materials move into and move out of animal cells, [16].
- I-3 Compare and contrast the composition, [5], structure, [5], and functions, [10], of DNA and RNA. Mention the different types of RNA.
- I-4 The organisms in a population usually show a large amount of variation in their phenotypes. Explain the role of mutation, [7], meiosis, [9], and sexual reproduction, [4], in producing this range of variation.
- I-5 With the aid of diagrams discuss the role of living organisms in the cycling of carbon, [10], and nitrogen, [10], in the biosphere.

Section II (OPTIONS)

Answer TWO questions from this Section, chosen from two different options.
(You must not choose your two questions from both Option 4a and Option 4b.)

Candidates are advised to confine their choice of questions to the options they have studied in detail.

Option 1. THE HEALTH OF MAN

- II-1 Human diseases are produced by a variety of causes. Distinguish between three transmissible diseases produced by DIFFERENT causes, [6]. For the diseases you name, describe their transmission mechanism, [10], and for each of them describe methods of prevention, [4].
- II-2 Explain the biological basis of immunity, [10]. Discuss the importance of immunisation, [4], and explain how immunity in humans can be increased, [6].

Option 2. ANIMAL BEHAVIOUR

- II-3 Egocentric behaviour is described by ethologists as the behaviour of an animal directed towards itself. Social behaviour may be considered to be behaviour directed towards other animals of the same species. Discuss, using two NAMED examples of each, different kinds of egocentric, [2 x 5], and social behaviour, [2 x 5].
- II-4 Discuss the following situations with reference to the kinds of behaviour involved in each case.
A spider builds a web, [6].
A dog picks up and carries a newspaper to its' master, [?].
Shortly after hatching, ducklings follow the first moving object to which they are exposed, [7].

Option 3. MOLECULAR GENETICS

- II-5 Discuss the ideas developed in the late 1950's by Francois Jacob and Jacques Monod of the Pasteur Institute in Paris with reference to the mechanism of control of bacterial genes, [16]. Use a diagram to explain such a mechanism, [4].
- II-6 "The sequence of amino-acids in molecules of proteins is coded in the sequence of nucleotides in molecules of DNA". Review the EXPERIMENTAL evidence that supports this statement, [13], and explain what is the "genetic code", [7].

Option 4a. BIOLOGY OF FLOWERING PLANTS

- II-7 Draw a diagram of a complete flower, [3]. Using named examples, and with the aid of diagrams, explain fertilization, [11], and how fruits, [3], and seeds, [3], are produced.
- II-8 With the aid of diagrams compare the primary structure of the root and the stem in a young angiosperm, [10]. Explain how these structures are related to their function, [10].

Option 4b. PLANT REPRODUCTION

- II-9 "Plant evolution shows a major trend of increasing terrestriality". Discuss the major problems derived from this adaptation, [14]. In relation with this evolution explain the changes which occurred in the life cycles of bryophytes, pteridophytes and angiosperms, [6].
- II-10 Describe four examples of asexual reproduction in plants, [4 x 3]. Discuss the advantages, [4], and disadvantages, [4], for man, of asexual reproduction in plants.

Option 5. MICROBIOLOGY

- II-11 With the aid of diagrams, [4], describe the structure of a prokaryotic cell, [4]. How does man benefit from the activities of prokaryotic cells? [12].
- II-12 Describe the instruments you used for the observation of two different groups of microorganisms in your laboratory, [6]. For the instruments you used, describe the techniques used including safety precautions, [6]. Make a clear labelled diagram of two microorganisms you observed with the described instruments and techniques, [4 x 2].

Option 6. EVOLUTION OF MAN

- II-13 Give the complete taxonomy of *Homo sapiens*, [7]. Describe the distinct characteristics of mammals, [4], Primates, [4], and *Homo sapiens*, [5].
- II-14 Describe a model of the evolutionary tree, [8], for the human species from *Dryopithecus* (Pro-consul) to *Homo sapiens* and include a discussion of the major fossil forms which support your model, [12].

Option 7. ECOLOGICAL PROJECT

- II-15 Describe IN DETAIL one technique that can be used to estimate the size of a NAMED population, [10]. For the technique you describe, explain the advantages and disadvantages of its use, [10].
- II-16 Use your work in a NAMED ecosystem to describe, [10], and discuss, [10], the different techniques available for the study of abiotic factors.

Option 8. MAN AND HIS FOOD

- II-17 Many biologists concur with the statement that "The impact of man on earth is not only proportional to the population density but also to the energy each individual consumes". Using precise arguments, [10], discuss this statement, [10].
- II-18 Describe in detail FOUR biological methods for increasing global food production, [4 x 5].
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