



# INTERNATIONAL BACCALAUREATE

## BIOLOGY

Subsidiary Level

Tuesday 14 May 1996 (afternoon)

Paper 3

1 hour 30 minutes

This examination paper consists of 2 sections.

Section A (Core) consists of 4 questions.

Section B (Options) consists of 8 questions.

The maximum mark for each question is 20.

This examination paper consists of 6 pages.

### INSTRUCTIONS TO CANDIDATES

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

**Answer ONE question from Section A.**

**Answer ONE question from Section B.**

### EXAMINATION MATERIALS

Required/Essential:

None

Allowed/Optional:

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

## SECTION A (CORE)

1. (a) Describe the structure of a cell membrane (plasma membrane). Use one or more diagrams to illustrate your answer. [7 marks]
- (b) Many different materials such as ions, water, gases and more complex molecules can be absorbed into cells. Explain the processes involved in the absorption of materials into cells. [13 marks]
2. (a) Describe the structure of a typical dicotyledonous leaf as seen in cross-section (cut across). Use a diagram to illustrate your answer. [12 marks]
- (b) List the stages in the path taken by water from a vascular bundle in a leaf to the atmosphere outside. [3 marks]
- (c) How is water loss through stomata regulated? Use diagrams to illustrate your answer. [5 marks]
3. (a) Draw and label a diagram of the human female reproductive system. [5 marks]
- (b) Describe the events of the menstrual cycle and the way in which the cycle is controlled by hormones. [15 marks]
4. (a) Define the genetic terms 'dominant' and 'recessive'. [4 marks]
- (b) Explain what is meant by the terms 'linkage' and 'crossing-over'. [4 marks]
- (c) Describe an experiment of the type carried out by Mendel to illustrate the principle of independent assortment (his Second 'Law'). [12 marks]

## SECTION B (OPTIONS)

## Human Ecology

5. (a) *Homo sapiens* is classified as a primate. State **six** anatomical features that are characteristic of primates, briefly explaining the advantage of each.

[12 marks]

(b) A number of features are common to **all** primates. State **four** of them that have developed further in the evolution of *Homo sapiens* and explain the advantage of each change.

[8 marks]

6. Describe **four** biological solutions that have been used to attempt to increase global food production. For **each** named solution you should:

- state how the method meets a particular need

[4 × 1 mark]

- give a biological account of the method of food production

[4 × 2 marks]

- indicate how successful the method has been

[4 × 1 mark]

- evaluate the future of the method, especially in economic terms.

[4 × 1 mark]

## Environmental Biology

7. (a) Discuss the differences between **renewable** and **non-renewable** energy resources. Give examples to illustrate your answer. [10 marks]
- (b) Mature natural ecosystems become damaged when people take resources from them. Describe briefly **five** ways in which they can become damaged as the result of such activity. [5 marks]
- (c) The rate of damage done to ecosystems by people is said to be increasing. Explain why this is so. [5 marks]
8. (a) Why are ecologists interested in knowing the distribution and abundance of organisms? [7 marks]
- (b) Explain, with an example, how you would estimate the **distribution** of a plant population? [6 marks]
- (c) Explain, with an example, how you would estimate the **density** of a population of mobile animals? [7 marks]

**Green Plants**

9. (a) State the conditions needed for seed germination. **[4 marks]**
- (b) Discuss the way in which the shoot of a plant responds to the direction of light and gravity. **[6 marks]**
- (c) Explain how plants can control when flowering takes place during the year. **[10 marks]**
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10. (a) Describe the life cycle of a fern. Use a diagram to illustrate your answer. **[12 marks]**
- (b) Describe the ways in which the life cycle of a flowering plant differs from that of a fern. **[8 marks]**

**Molecular Biology**

11. (a) Draw diagrams to show the structure of a virus, a prokaryotic cell and a eukaryotic animal cell. [12 marks]
- (b) State **three** ways in which the structure of a virus is similar to and/or different from plant cells. [3 marks]
- (c) Explain why viruses are harmful to their hosts. [5 marks]
12. (a) State **four** advantages that bacteria such as *Escherichia coli* offer as tools for biotechnology. [4 marks]
- (b) Describe how genetic material can naturally be transferred from one *E. coli* cell to another by conjugation. Use a diagram to illustrate your answer. [8 marks]
- (c) Explain ways in which restriction enzymes and ligase are used in genetic engineering. [8 marks]
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