



Biology

Standard Level

Paper 2 — Mock Examination

Mock Exam 1

Calculator required

Time allowed: **1 hour 30 minutes**

Maximum mark: **50 marks**

Candidate information

Candidate name:

Session number:

Date:

Topic emphasis: unity and diversity (water, nucleic acids, cells, ecosystems), form and function (cell structure, gas exchange, digestion), interaction and interdependence (enzymes, cell respiration, energy flow) and continuity and change (meiosis, natural selection, evolution).

Instructions to candidates

- Write your session number in the box on the cover.
- Do not open this examination paper until you are told to do so.
- Section A: answer **all** questions.
- Section B: answer **one** question.
- Answers must be written within the answer boxes provided.
- A calculator is required for this paper.
- The maximum mark for this examination paper is **[50 marks]**.

The mark allocation is shown in square brackets at the end of each question or part question. Where a numerical answer is required, working must be shown; marks are available for a correct method even when the final answer is incorrect. Answers should be given to an appropriate number of significant figures and units must be included where relevant.

In Section B, **one additional mark** is available for the construction of your answer. This mark is awarded when your answer is clear enough to be understood without re-reading and is written succinctly, with little or no repetition or irrelevant material.

Mark allocation**Section A**

Question 1	[12 marks]
Question 2	[7 marks]
Question 3	[6 marks]
Question 4	[5 marks]
Question 5	[4 marks]

Section B

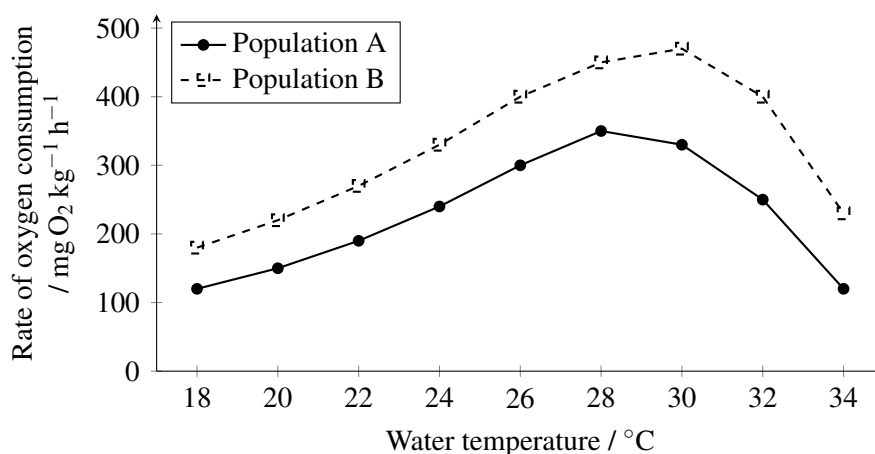
Question 6 or Question 7	[16 marks]
Total	[50 marks]

Section A

Answer **all** questions. Answers must be written within the answer boxes provided.

1. The rate of oxygen consumption of a fish is a measure of its metabolic rate. Many coral reef fish already live close to their upper thermal limits.

Two populations of the spiny chromis, *Acanthochromis polyacanthus*, were compared. Population A was collected from a high-latitude reef with cooler water and Population B was collected from a low-latitude reef with warmer water. Fish from both populations were acclimated in tanks for four weeks. The rate of oxygen consumption of each fish was then measured over a range of water temperatures. Ten fish were tested at each temperature and the mean values were plotted.



- (a) State the temperature at which oxygen consumption in Population B is highest. [1]

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- (b) Calculate the increase in the rate of oxygen consumption of Population A between 20 °C and 28 °C. [1]

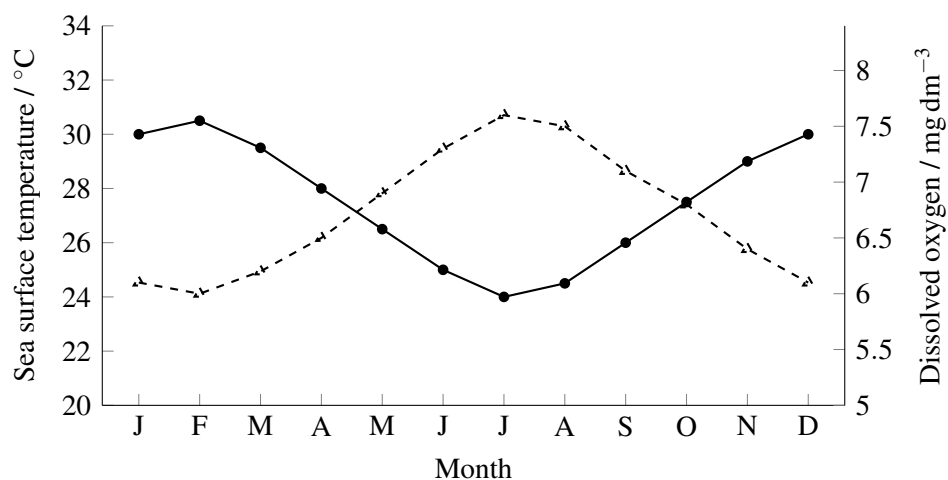
- (c) Compare **and** contrast the responses of the two populations to increasing water temperature. [2]

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(Question 1 continued)

Mean monthly sea surface temperature and the concentration of dissolved oxygen in the surface water were recorded at the low-latitude reef over one year.



Key: —●— sea surface temperature -△- dissolved oxygen

- (d) (i) Describe the relationship between sea surface temperature and the concentration of dissolved oxygen. [2]

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- (ii) Suggest reasons for this relationship. [2]

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(Question 1 continued)

- (e) Predict, giving reasons, the effect on the fish of Population B if the mean sea surface temperature of the low-latitude reef rose by 4 °C throughout the year. [2]

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- (f) Using the data in the graphs, discuss which of the two populations is more likely to be adversely affected by ocean warming. [2]

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2. Nucleic acids store and transfer the genetic information of a cell.

- (a) Outline the process of transcription. [3]

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- (b) In a sample of DNA extracted from the liver of a mouse, 23 % of the bases were adenine. Deduce the percentage of the bases that were guanine, showing your reasoning. [2]

- (c) State **two** differences between the structure of a DNA nucleotide and the structure of an RNA nucleotide. [2]

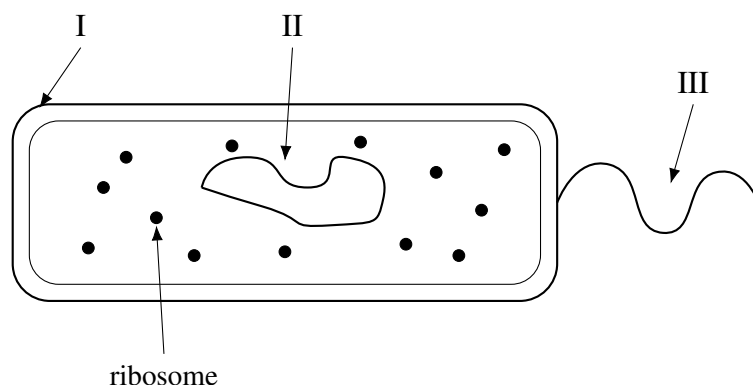
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3. The diagram shows the structure of a prokaryotic cell. The diagram is not drawn to scale.



- (a) Identify the structures labelled I, II and III.

[3]

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- (b) The length of the cell in the diagram, excluding structure III, is 65 mm. The actual length of the cell is 2.6 μm . Calculate the magnification of the diagram.

[1]

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- (c) Outline **one** advantage to a prokaryotic cell of having a large surface area to volume ratio.

[2]

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4. Gas exchange in humans takes place in the alveoli of the lungs.

- (a) Explain **two** adaptations of alveoli that allow efficient gas exchange. [2]

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- (b) Distinguish between the composition of inhaled air and the composition of exhaled air.[2]

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- (c) State the effect of vigorous exercise on ventilation rate. [1]

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5. Energy and carbon move through the organisms of an ecosystem.

- (a) Distinguish between a food chain and a food web. [1]

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- (b) Explain why the total biomass of producers in an ecosystem is usually greater than the total biomass of primary consumers. [2]

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- (c) State **one** human activity that increases the concentration of carbon dioxide in the atmosphere. [1]

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Section B

Answer **one** question. One additional mark is available for the construction of your answer. Answers must be written within the answer boxes provided.

6. Enzymes catalyse the reactions of metabolism, including the reactions of digestion and of cell respiration.
- (a) Explain the effect of temperature on the activity of an enzyme. [4]
 - (b) Describe how starch is digested in humans and how the products of this digestion are absorbed. [7]
 - (c) Outline how ATP is produced in human muscle cells and in yeast cells when oxygen is not available. [4]
7. Species change over time as a result of variation and selection.
- (a) Explain how meiosis produces genetic variation among the gametes of one individual. [5]
 - (b) Describe how a population of bacteria may become resistant to an antibiotic. [7]
 - (c) Outline how the base sequences of DNA can be used as evidence of how closely two species are related. [3]

End of examination.

Total: 50 marks
