

231/2

— **BIOLOGY** —  
(THEORY)

**Paper 2**



**Apr. 2021 – 2 hours**

Name ..... Index Number .....

Candidate's Signature ..... Date .....

**Instructions to Candidates**

- (a) Write your name and index number in the spaces provided above.
- (b) Sign and write the date of examination in the spaces provided above.
- (c) This paper consists of **two** sections; **A** and **B**.
- (d) Answer **all** the questions in section **A** in the spaces provided.
- (e) In section **B** answer question **6** (**compulsory**) and either question **7** or **8** in the spaces provided after question **8**.
- (f) **This paper consists of 12 printed pages.**
- (g) **Candidates should check the question paper to ascertain that all the pages are printed as indicated and that no questions are missing.**
- (h) **Candidates should answer the questions in English.**

**For Examiner's Use Only**

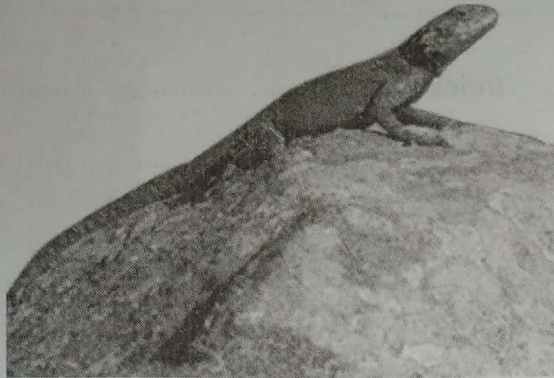
| Section     | Question | Maximum Score | Candidate's Score |
|-------------|----------|---------------|-------------------|
| A           | 1        | 8             |                   |
|             | 2        | 8             |                   |
|             | 3        | 8             |                   |
|             | 4        | 8             |                   |
|             | 5        | 8             |                   |
| B           | 6        | 20            |                   |
|             |          | 20            |                   |
| Total Score |          | 80            |                   |



## SECTION A (40 marks)

Answer **all** questions in this section in the spaces provided.

1. Below are photographs E and F, of two organisms, taken from their natural habitats.



E



F

- (a) (i) State the **main** nitrogenous waste product of the organism in photograph E. (1 mark)
- .....
- .....
- (ii) Give a reason for your answer in a(i) above. (1 mark)
- .....
- .....
- (b) State why the organism in photograph E is usually found on top of rock surfaces even during hot, sunny days. (1 mark)
- .....
- .....
- .....
- .....

- (c) (i) Which of the two organisms would have a higher biomass if both were left in their natural ecosystem. (1 mark)

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- (ii) Give a reason for your answer in c(i). (1 mark)

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- (d) With reference to observable features, explain why the organism in photograph F is usually found in a wider range of habitats. (3 marks)

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2. The genetic make-up of a man was found to be XXY.

- (a) Name the syndrome the individual could be suffering from. (1 mark)

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- (b) Explain how the syndrome occurs. (4 marks)

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- (c) (i) State how the chemical, colchicine induces polyploidy in plants. (1 mark)

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- (ii) State **one** advantage of polyploidy in wheat farming. (2 marks)

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3. In an experiment to investigate the effect of temperature on seed germination, soaked maize seeds were subjected to varying temperatures as tabulated below.

| Temperature (°C)           | 0 | 6 | 12  | 17 | 28 | 33 | 41.5 | 51 |
|----------------------------|---|---|-----|----|----|----|------|----|
| Percentage germination (%) | 0 | 0 | 2.5 | 5  | 13 | 44 | 26   | 3  |

- (a) Account for the percentage germination at:

- (i) 6 °C; (3 marks)

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- (ii) 33 °C. (3 marks)

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- (b) State **two** internal factors that affect seed germination. (2 marks)

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4. A student could clearly read a book placed 10 cm away but could not clearly identify a fellow student 12 m away.

(a) Name the eye defect the student was suffering from. (1 mark)

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(b) Explain why the student could **not** clearly identify his colleague yet could read the book. (3 marks)

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(c) Using a diagram, illustrate how the defect can be corrected. (3 marks)

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(d) Name the vitamin whose deficiency in the diet results in poor vision. (1 mark)

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5. The table below shows the volume of gases contained in  $100 \text{ cm}^3$  of a blood sample tapped at two points in the mammalian circulatory system.

| Gas               | Blood entering lungs ( $\text{cm}^3$ ) | Blood leaving lungs ( $\text{cm}^3$ ) |
|-------------------|----------------------------------------|---------------------------------------|
| Oxygen            | 8.65                                   | 20.25                                 |
| Nitrogen          | 0.75                                   | 0.75                                  |
| Carbon (IV) oxide | 55.60                                  | 31.65                                 |

- (a) Account for the difference in the gaseous composition of:

(2 marks)

- (i) Blood entering the lungs;

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- (ii) Blood leaving the lungs.

(2 marks)

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- (b) Name the blood vessel through which blood enters the lungs.

(1 mark)

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- (c) Explain why most athletes prefer training from high altitude areas.

(3 marks)

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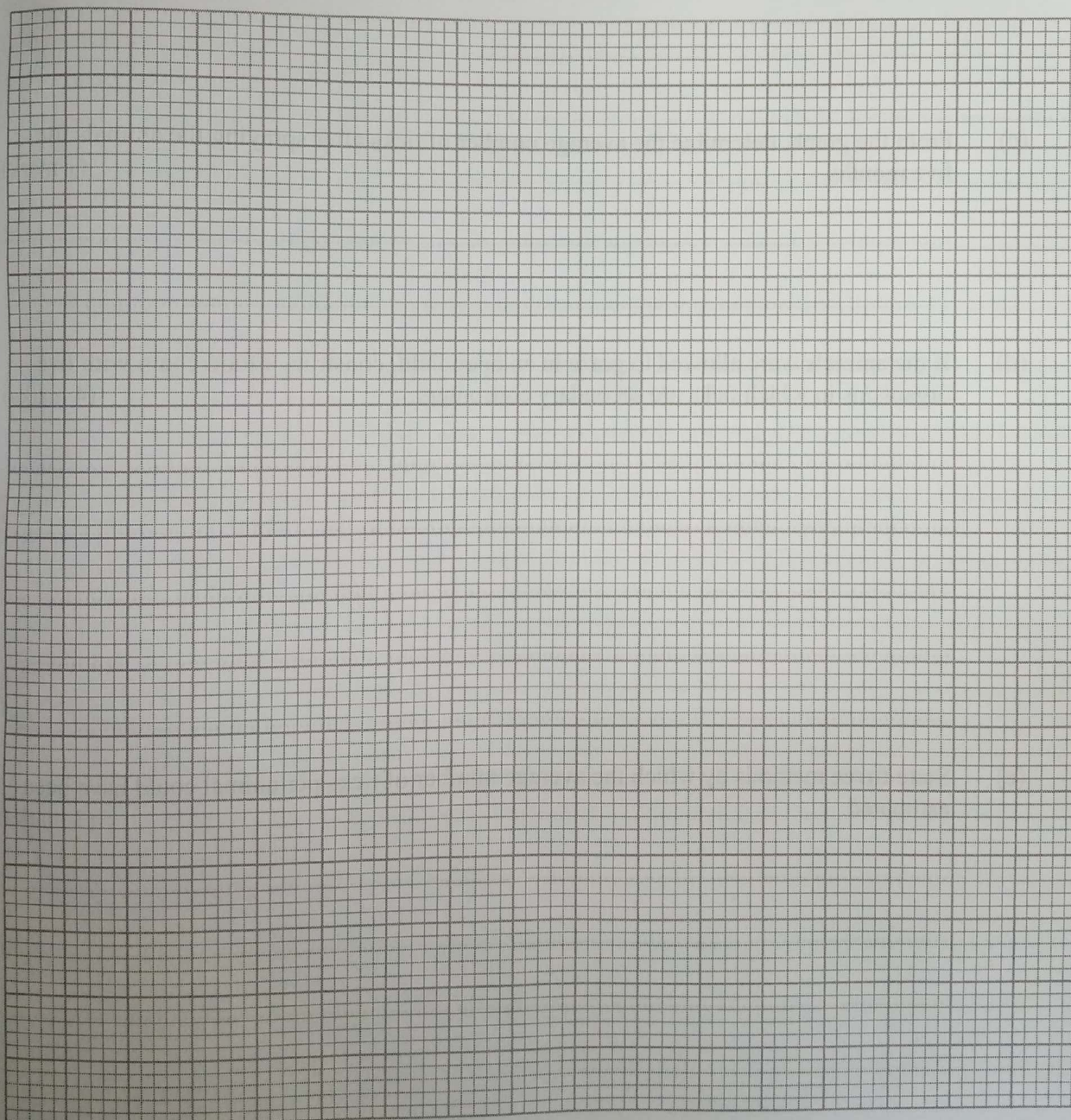
**SECTION B (40 marks)**

Answer question 6 (compulsory) and either question 7 or 8 in the spaces provided after question 8.

6. The data below shows the average number of ticks per animal in a certain farm before and after spraying the animals with a certain chemical. The spraying was done once every month. The data was tabulated as shown below.

| Time (months)           | 0   | 2  | 4  | 6  | 8  | 10 | 12 | 14 |
|-------------------------|-----|----|----|----|----|----|----|----|
| Average number of ticks | 200 | 90 | 40 | 20 | 16 | 25 | 45 | 90 |

- (a) Plot a graph of number of ticks against time. (6 marks)



(b) Account for the shape of the graph between:

(i) 0 and 8 months; (3 marks)

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(ii) 10 and 14 months. (3 marks)

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(c) From the graph, determine the average number of ticks after spraying the animals for five months. (1 mark)

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(d) If the animals were allowed to graze in an open field, construct a food chain with five organisms in which ticks are secondary consumers. (4 marks)

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(e) State **three** methods by which the average number of ticks per animal could have been estimated. (3 marks)

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