231/2 — **BIOLOGY** — **Paper 2**

(THEORY)

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

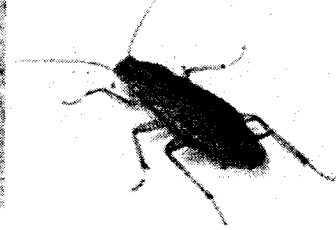| Section	Question	Maximum Score	Candidate's Score
A	1	8	
	2	8	
	3	8	
	4	8	
	5	8	
B	6	20	
	–	20	
Total Score		80	

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)

....

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

....

....

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

....

....

....

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)

....

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

....

....

....

....

....

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

....

....

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

....

....

....

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:

                                                                            (3 marks)

     (i)   6°C;

....

....

....

                                                                           (3 marks)

     (ii)   33°C.

....

....

....

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

....

....

....

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)

....

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

....

....

....

....

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

....

....

....

....

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

....

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

Gas	Blood entering lungs (cm^3)	Blood leaving lungs (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:

    (i) Blood entering the lungs;   (2 marks)

....

....

....

    (ii) Blood leaving the lungs.   (2 marks)

....

....

....

(b) Name the blood vessel through which blood enters the lungs.   (1 mark)

....

(c) Explain why most athletes prefer training from high altitude areas.   (3 marks)

....

....

....

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)

Kenya Certificate of Secondary Education, 2020
231/2
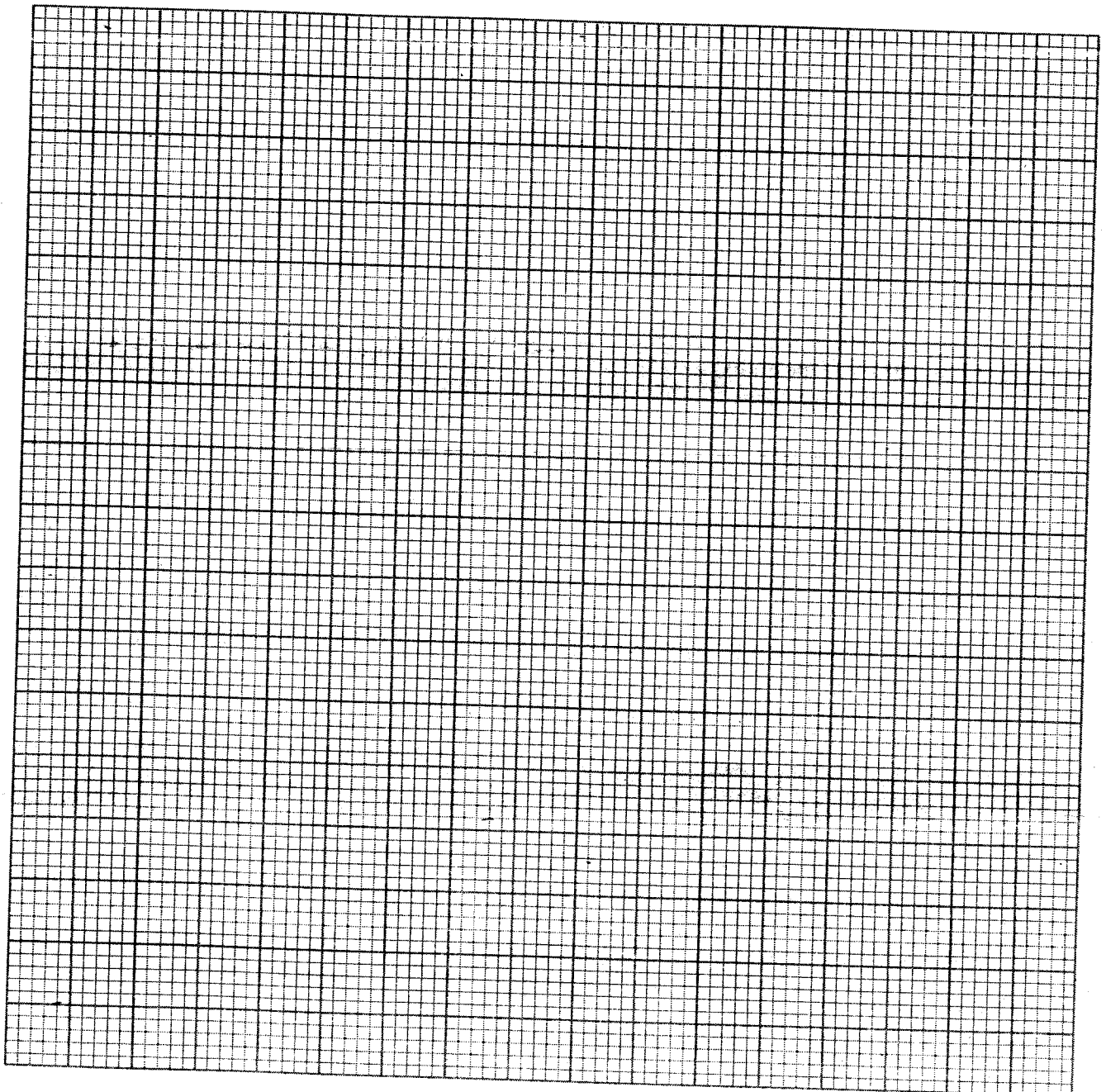
(b)   Account for the shape of the graph between:

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

....

....

....

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

....

....

....

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

....

....

(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)

....

....

....

....

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

....

....

....

7.   (a)   Explain the role of the liver in blood sugar regulation.   (3 marks)

       (b)   Describe how human blood is adapted to its function.   (17 marks)

8.   (a)   Explain how the presence of chloroplasts in guard cells affect the opening of stomata.

                             (5 marks)

       (b)   Describe how various environmental factors affect the rate of photosynthesis.

                             (15 marks)