Grade 11 Biology Model Paper 2

MODEL PAPER

Full marks 75 · 3 hours

Name _____ Class ____ Roll no. ____ Date _____ Marks ____ / 75

Answer every question; where a question has an OR question, answer either one. Time: 3 hours.

A practice paper by Science Playground, made to CDC's Specification Grid 2077, Grade 11 Biology (Bio. 201); not an official CDC or NEB paper. Mark it yourself online: the QR code below opens the paper with its answers.

A full practice run of NEB's Grade 11 Biology paper (Bio. 201): 75 marks in 3 hours. Question 1 is group A, 11 multiple-choice items; questions 2 to 9 are group B (short answers, 5 marks each) and questions 10 to 12 group C (long answers, 8 marks each), each of two to four parts with the marks of each part. Questions 2 and 7 in group B and Question 10 in group C have an OR question: answer either one. Write your answers on paper as in the exam hall, then tap your choice in group A, open each other part's answer and give yourself the marks its scheme allows.

Group A Multiple choice — 11 marks

Question 1 — 11 × 1 = 11

Choose the correct option for each of the following questions.

a. Only small amounts of CFCs reach the stratosphere, yet they destroy a great deal of ozone. Why?

(i) CFCs absorb all the ultraviolet light that ozone needs.
(ii) CFCs react with oxygen to make more CFCs.
(iii) CFCs make the stratosphere so warm that ozone boils away.
(iv) Each chlorine atom freed from them acts as a catalyst, breaking up ozone molecules again and again.

b. In which year was the National Botanical Garden at Godawari, Lalitpur, Nepal's oldest and largest botanical garden, set up?

(i) 1962 (ii) 1952 (iii) 1973 (iv) 1988

c. Which of these is a method of **in-situ** conservation?

(i) Keeping seeds of local rice at −18 °C in a genebank
(ii) Growing rare orchids in a botanical garden
(iii) Protecting red pandas in their own forest in a national park
(iv) Keeping pieces of plant tissue alive in tubes

d. What is the study of fungi called?

(i) Mycology (ii) Phycology (iii) Bryology (iv) Pteridology

e. Under an electron microscope, Swastika sees a cell about 2 μm long with its DNA lying free in the cytoplasm, no membrane round it, no mitochondria, and small 70S ribosomes. What is the cell most likely to be?

(i) A yeast cell (ii) A cell of an onion root tip
(iii) A bacterium (iv) A red blood cell of a frog

f. Which three categories of the IUCN Red List are together called the "threatened" categories?

(i) Extinct, Extinct in the Wild and Critically Endangered
(ii) Endangered, Vulnerable and Near Threatened
(iii) Vulnerable, Near Threatened and Least Concern
(iv) Critically Endangered, Endangered and Vulnerable

g. Rehan moves some *Paramecium* from pond water into water a little saltier than their cytoplasm. What will most likely happen to their contractile vacuoles?

(i) They will fill and empty much faster than before.
(ii) They will burst.
(iii) They will turn into food vacuoles.
(iv) They will fill and empty more slowly, or stop.

h. What did the Miller–Urey experiment of 1952–53 show?

(i) That life comes only from pre-existing life
(ii) That the first cells formed in a week in a flask
(iii) That amino acids can form from simple gases such as methane, ammonia and hydrogen when energy is supplied
(iv) That the early Earth's air was rich in oxygen

i. The protein cytochrome c has 104 amino acids in humans. The chimpanzee's is identical, the rhesus monkey's differs in one, a dog's in about 11 and a yeast's in about 44. What do these numbers tell us?

(i) The fewer the differences, the more recently two species shared a common ancestor.
(ii) Yeast is more advanced than the dog.
(iii) The protein does different jobs in each species.
(iv) Humans evolved from chimpanzees.

j. A fossil skullcap with a brain of about 900 cc and a thigh bone showing upright walking was found by the Solo river on the island of Java in 1891. To which species does it belong?

(i) *Australopithecus* (ii) *Homo habilis*
(iii) *Homo erectus* (iv) *Homo neanderthalensis*

k. About 30 families settled a remote Himalayan valley three hundred years ago, and few people have moved in since. A rare inherited condition that is almost unknown elsewhere is now common in the valley, although it gives no advantage. Which is the best explanation?

(i) The founder effect: one of the few founders happened to carry the allele.
(ii) Natural selection favored the condition in the cold.
(iii) The condition was acquired by living at high altitude and then inherited.
(iv) Gene flow brought the allele in from outside.

Group B Short answers, each on one content area — 40 marks

Question 2 — 5 marks

On a damp, shady slope in Shivapuri, Sujan turns over a fern frond (*Dryopteris*) and finds two rows of small round brown dots on each leaflet.

a. What are these dots called, and what covers and protects each of them when young? **[2]**

b. One sporangium of Sujan's fern has 16 spore mother cells. How many spores will it make? Are the spores haploid or diploid, and is the fern homosporous or heterosporous? **[2]**

c. The fern plant is a large, independent sporophyte with roots and vascular tissue, yet ferns are found mostly in damp, shady places. Explain why. **[1]**

OR

Ayushma's uncle runs a fish farm in Chitwan, and her aunt works in a microbiology laboratory that grows bacteria on agar plates.

a. Name two products obtained from red algae, with one use of each. **[2]**

b. Ayushma's uncle adds fertilizer to his fish ponds although the fish don't eat it. Explain why this increases his fish harvest. **[2]**

c. Before 1881, Koch's laboratory grew bacteria on gelatin. Why was agar a much better choice? **[1]**

Question 3 — 5 marks

In a class project on Nepal's plants and animals, Aayusha writes: "The tiger is Panthera Tigris and the potato is solanum tuberosum."

a. Who gave biology the system of binomial nomenclature, and in which book? **[1]**

b. Point out the mistakes in Aayusha's names, and write them correctly as she should in her handwritten project. **[2]**

c. Bacteria and archaea are both prokaryotes, yet Woese put them in two different domains. Give two differences that justify this. **[2]**

Question 4 — 5 marks

Chitwan's grasslands feed chital, and the chital feed tigers. In the sal forest beside them, one tree can feed thousands of caterpillars.

a. Why is the pyramid of number of a forest spindle-shaped, while that of a parasitic food chain (a tree, birds on it, lice on the birds) is fully inverted? **[2]**

b. The grass of a patch of grassland stores 50,000 kJ of energy in a season. Using the ten percent law, how much of it reaches the tigers in the chain grass $\rightarrow$ chital $\rightarrow$ tiger? **[1]**

c. A farmer near the park says that snakes in his paddy field are useless and wants them all killed. Using the food chain rice $\rightarrow$ rat $\rightarrow$ snake, predict what would happen, and judge his idea. **[2]**

Question 5 — 5 marks

Sanskriti's class reads that viruses lie on the border between living and non-living things.

a. Write two characteristics of viruses that are like non-living things, and two that are like living things. **[2]**

b. Describe how bacteriophage T4 gets its DNA into an *E. coli* cell, and what happens after that. **[2]**

c. Sanskriti's cousin has the flu and asks for an antibiotic. Explain why it won't help. **[1]**

Question 6 — 5 marks

A study of a lake food chain measured the DDT in each level: water 0.00005 ppm, plankton 0.05 ppm, small fish 0.5 ppm, large fish 2 ppm and fish-eating birds 25 ppm. (These numbers are given for this question.)

a. Why are organochlorines such as DDT called hard pesticides? **[1]**

b. How many times as concentrated is the DDT in the birds as in the water? Name the process and explain why the concentration rises at each level. **[2]**

c. Chiring's family grows cauliflower in Kavre and sprays a pesticide every week. Each year the caterpillars come back stronger, and they spray more. Explain what is happening, and suggest two better ways to protect the crop. **[2]**

Question 7 — 5 marks

***Plasmodium vivax*, which causes malaria, needs two hosts to complete its life cycle.**

a. Name the primary and the secondary host of *Plasmodium vivax*, and say which phase of its life passes in each. **[2]**

b. Why does the fever of *vivax* malaria come back every 48 hours? **[1]**

c. A doctor in Kailali says *falciparum* malaria needs more urgent treatment than *vivax*, but *vivax* needs an extra medicine to stop it coming back. Explain both parts of her advice. **[2]**

OR

In winter, Pragya finds a frog buried in the mud at the bottom of a pond in Lalitpur, quite still.

a. Name the three ways in which a frog breathes. **[2]**

b. How does Pragya's frog breathe while it lies in the mud, and what makes its skin suitable for this? **[1]**

c. A frog kept in a dry glass box in the sun for a day dies, although its lungs still work. Explain why. **[2]**

Question 8 — 5 marks

Sangam's teacher shows the class three preserved animals: a *Hydra*, a starfish and a cockroach.

a. Place each animal in its phylum, giving one feature of each that you could see that supports your choice. **[3]**

b. *Hydra* and the adult starfish are both radially symmetrical, and the two groups were once kept together as the Radiata. Give two pieces of evidence that the starfish is not closely related to *Hydra*. **[2]**

Question 9 — 5 marks

The human body keeps organs that no longer do much work.

a. What are vestigial organs? **[1]**

b. Which of these in a human is vestigial: the heart, the vermiform appendix, the liver, the tongue? How does it show evolution? **[1]**

c. The first skeleton of *Archaeopteryx* was found in 1861, two years after Darwin's *Origin of Species*. Name two reptile features and two bird features it had, and explain why it was such strong evidence for evolution. **[3]**

Group C Long answers, each on one content area — 24 marks

Question 10 — 8 marks

Utsab leaves a damp piece of bread in a closed tin. A week later it is covered with a white cottony growth with tiny black pin-heads: *Mucor*.

a. Name two structures by which *Mucor* reproduces asexually. **[2]**

b. Explain the steps of sexual reproduction (conjugation) in *Mucor*, up to the formation of the zygospore. **[3]**

c. Utsab's class counts lichens on tree trunks: near a busy road in Kathmandu they find only a few crusts, but in Shivapuri the trees carry leafy lichens and long shrubby *Usnea*. Explain what this tells them and why lichens are good for such a survey. **[3]**

OR

Pratik's family grows tomato, brinjal and chilli in a kitchen garden in Ilam. All belong to the family Solanaceae.

a. Write the floral formula of Solanaceae, and name the type of fruit of the tomato. **[2]**

b. Explain these features of a solanaceous flower: (i) epipetalous stamens, (ii) a persistent calyx, (iii) an obliquely placed ovary with axile placentation. **[3]**

c. Pratik's neighbor grows *Datura* as an ornamental beside the vegetables, and says that since it belongs to the same family as the tomato, its seeds must be safe to eat. Judge this, and name one useful and one harmful product of the family. **[3]**

Question 11 — 8 marks

Simran tests the enzyme salivary amylase on starch at different temperatures and records how long the starch takes to disappear (when iodine stops turning blue-black):

Temperature (°C)	10	25	37	50	70
Time taken (minutes)	20	8	3	9	never

a. Write three characteristics of enzymes. **[3]**

b. From Simran's results, at which temperature does the enzyme work fastest? Explain why the reaction is slower at 10 °C, and why it never finishes at 70 °C. **[3]**

c. Simran then brings both the 10 °C tube and the 70 °C tube to 37 °C and adds fresh starch. Predict what happens in each, and explain. **[2]**

Question 12 — 8 marks

Earthworms come out on the paths of Bhaktapur's gardens on rainy nights in August, and some are found lying in pairs.

a. The earthworm is hermaphrodite. What does this mean? **[1]**

b. If each worm has both kinds of organs, why must two worms mate? Explain. **[2]**

c. During mating, which segment of one worm lies against which segments of the other, and what passes between them? **[2]**

d. Some days after mating, a worm makes a cocoon. Explain how the cocoon is made, and why the eggs end up fertilized by the partner's sperm, not the worm's own. **[3]**