Grade 11 Biology Model Paper 3

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. Succulents such as *Opuntia* and *Aloe* open their stomata only at night, storing the carbon dioxide they take in as an acid for use in the day. How does this help them?

(i) It lets them photosynthesize in the dark.
(ii) It keeps oxygen out of their leaves.
(iii) The stomata are open only when it is cool, so far less water is lost by transpiration.
(iv) It lets them take in water through the stomata at night.

b. Which tree dominates Nepal's tropical forests, below about 1,000 m in the Terai and the Chure hills?

(i) *Shorea robusta* (sal)
(ii) *Schima wallichii* (chilaune)
(iii) *Abies spectabilis* (fir)
(iv) *Quercus semecarpifolia* (khasru)

c. Sal forests cover the Terai, but none grow at Daman, at 2,300 m. What mainly stops sal from growing so high?

(i) Too much rain on the high ridges
(ii) The soil is too rich
(iii) Animals eat every seedling
(iv) Cold: its seedlings are killed by frost, and it needs a long, hot growing season

d. What does herpetology study?

(i) Insects
(ii) Reptiles and amphibians
(iii) Parasitic worms
(iv) Mollusks

e. A pollen mother cell of a plant has 24 chromosomes. It divides by meiosis. How many chromosomes does each of the cells it makes have, and how many cells are there?

(i) Two cells of 24
(ii) Four cells of 24
(iii) Four cells of 12
(iv) Two cells of 12

f. Which two tests must a region pass to be called a biodiversity hotspot?

(i) At least 1,500 endemic species of vascular plant, and at least 70% of its natural vegetation already lost
(ii) At least 1,500 species of bird, and a national park
(iii) At least 70% of its land still covered by forest, and many endemic animals
(iv) A tropical climate, and at least one Ramsar site

g. On a beach at night, Lhakpa sees the breaking waves glow blue. Under a microscope the water holds clear, round single cells about half a millimeter across that flash when disturbed. To which phylum of protists do they belong?

(i) Euglenophyta (ii) Chrysophyta (iii) Sarcodina (iv) Pyrrophyta

h. Which of these ideas is **not** part of Darwin's theory of natural selection?

(i) Organisms produce far more young than can survive.

(ii) Changes an organism acquires by using or not using its organs are passed on to its young.

(iii) Individuals vary, and some variations are inherited.

(iv) Those with useful variations survive and breed more.

i. In Redi's experiment of 1668, maggots appeared on the meat in open jars but not on the meat in jars covered with gauze, which let air in. What did this show?

(i) Meat needs air to rot.

(ii) Gauze kills maggots.

(iii) Maggots come from eggs laid by flies, not from the meat itself.

(iv) Microbes arise by themselves in broth.

j. In precipitin tests, anti-whale serum gives a strong precipitate with the serum of a hippopotamus, a weaker one with a dog's, and almost none with a fish's. What does this suggest?

(i) Whales are most closely related to even-toed hoofed mammals such as the hippopotamus.

(ii) Whales evolved from fish.

(iii) Whales are most closely related to dogs.

(iv) Serum proteins tell us nothing about relationships.

k. The oldest *Homo sapiens* fossils, about 300,000 years old, are from Morocco; modern humans reached Australia about 50,000 years ago, Europe about 45,000 and the Americas at least 20,000. Which conclusion do these dates best support?

(i) Modern humans arose in Europe and spread south.

(ii) Modern humans arose separately on each continent.

(iii) Modern humans reached the Americas before Europe.

(iv) Modern humans arose in Africa and later spread over the rest of the world.

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

Question 2 — 5 marks

On the stone walls of a damp lane in Bandipur, Bimala finds soft green cushions of moss.

a. Write two characteristic features of bryophytes. **[2]**

b. A nursery in Godawari sends seedlings to farmers with their roots wrapped in damp *Sphagnum* moss. Explain why *Sphagnum* is good for this, and give one other use of dried mosses. **[2]**

c. Bryophytes are called the amphibians of the plant kingdom. Explain why the name fits. **[1]**

OR

Kushal's family in Jumla burns chir pine wood, and his uncle collects *Ephedra* on the dry slopes above the village.

a. Write two characteristic features of gymnosperms. **[2]**

b. Name one product Kushal's village could get from each of these, with its use: (i) *Ephedra*, (ii) the resin of chir pine. **[2]**

c. Pines grow on dry hillsides where ferns can't reproduce. What in their reproduction frees them from needing water, as ferns need it? **[1]**

Question 3 — 5 marks

Gopal's aunt brings back three dried seaweeds from a trip to the coast, and his class reads their labels: sample X, a long brown kelp; sample Y, a red jelly-weed; sample Z, a bright green sheet.

a. Name the pigment that gives red algae their color. **[1]**

b. Laboratory tests show that sample X contains chlorophyll *a*, chlorophyll *c* and fucoxanthin and stores laminarin and mannitol, while sample Z contains chlorophylls *a* and *b* and stores starch. To which class does each belong? **[2]**

c. Of the three classes, which is thought to have given rise to the land plants? Give two pieces of evidence from the algae themselves. **[2]**

Question 4 — 5 marks

The potato and maize came to Nepal from the Americas, as did *Mikania micrantha* and water hyacinth.

a. The potato is an exotic species but not an invasive one; *Mikania* is both. Explain the difference, and give one feature that makes invasive species spread so well. **[2]**

b. A floating plant from South America covers parts of Phewa Lake, choking boats. Name it, and say why the lake's fish suffer where it spreads. **[1]**

c. A group suggests bringing an insect from South America that eats only *Mikania* to control it in Chitwan. Judge the plan: what must be done first, and why might it work better than spraying herbicide? **[2]**

Question 5 — 5 marks

Farmers near Pokhara let a small floating water fern, *Azolla*, cover their flooded rice fields. Its leaves shelter the cyanobacterium *Anabaena*.

a. Write two characteristic features of cyanobacteria. **[2]**

b. Explain how *Azolla* increases the farmers' rice harvest, naming the cells of *Anabaena* that do the work. **[2]**

c. Cyanobacteria were once called blue-green algae. Why is that name wrong? **[1]**

Question 6 — 5 marks

Sarita's class compares two Himalayan animals: a mole that lives underground, and a fruit bat that flies at dusk over Kathmandu.

a. What is fossorial adaptation? **[1]**

b. The mole has tiny eyes hidden in its fur and no outer ears, and its front feet are broad, turned outward and armed with long claws. Explain how each of these suits its life underground. **[2]**

c. Both bats and birds fly by flapping, and their wings are both forelimbs. Compare how their wings are built, and say why the bat's wing makes it so agile. **[2]**

Question 7 — 5 marks

In a jar of green pond water from Taudaha, Dawa sees under a microscope tiny spindle-shaped green cells swimming with a whip-like flagellum, each with a red spot near its front: *Euglena*.

a. Write two features of *Euglena* that are like those of plants, and two that are like those of animals. **[2]**

b. What is the red spot near the base of the flagellum, and how does it help *Euglena*? **[1]**

c. For two thousand years living things were sorted into plants and animals. Using *Euglena*, explain why biologists made a separate kingdom, Protista. **[2]**

OR

Junu's class lets an earthworm crawl first over damp blotting paper and then over a sheet of glass.

a. What are setae made of, and on which segments of the earthworm are they **absent**? **[2]**

b. What happens to a segment when its circular muscles contract, and why? **[1]**

c. On the blotting paper the worm moves forward steadily; on the glass it slips and hardly gets anywhere. Explain. **[2]**

Question 8 — 5 marks

Every chordate has three characters at some stage of its life.

a. Using these characters, say whether each of these is a chordate, giving the reason: (i) a rohu fish, (ii) an earthworm, (iii) a lancelet. **[3]**

b. Manisha says that she can't be a chordate, since she has no notochord and no gill slits. Judge her claim. **[2]**

Question 9 — 5 marks

In 1856, quarry workers in a cave in the Neander valley in Germany found a skullcap and bones of an ancient human.

a. Neanderthals were short and stocky, with thick bones. How did this suit them to their environment? **[1]**

b. A skull from a cave in Europe has a brain of about 1,450 cc, heavy brow ridges, a low sloping forehead and no chin, and lies with skilled pointed stone tools struck from prepared cores. To which species does it most likely belong? **[1]**

c. One student says Neanderthals were our ancestors and simply turned into modern humans; another says they died out and left nothing in us. Judge both claims using the evidence. **[3]**

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

Question 10 — 8 marks

In a mustard field in Chitwan in January, Puja picks a flower: four petals spread like a cross, six stamens, and below it a long, thin pod.

a. Write the floral formula of Brassicaceae, and name its typical fruit. **[2]**

b. Explain these features of the mustard flower: (i) cruciform corolla, (ii) tetradynamous stamens, (iii) parietal placentation with a replum. **[3]**

c. Puja's friend says that a plant with a radish-like swollen root, four cross-shaped petals, four long and two short stamens and a pod that splits from below must be in the potato family, Solanaceae, since both give vegetables. Judge this, using three features. **[3]**

OR

Nima's teacher asks the class to place a mushroom, *Spirogyra* and *Nostoc* in kingdoms.

a. Who proposed the five-kingdom classification, and when? Name the five kingdoms. **[2]**

b. Explain three of the criteria Whittaker used. **[3]**

c. Place the mushroom, *Spirogyra* and *Nostoc* in Whittaker's kingdoms, and justify each. **[3]**

Question 11 — 8 marks

Bishal looks at electron micrographs of a liver cell, a sperm and a mature red blood cell of a human.

a. Describe the structure of a mitochondrion. **[3]**

b. Bishal finds 1,000–2,000 mitochondria in the liver cell, mitochondria packed round the base of the sperm's tail, and none in the red blood cell. Explain each finding. **[3]**

c. Mitochondria have their own DNA and ribosomes and divide by fission. Does this make them independent of the nucleus? Judge. **[2]**

Question 12 — 8 marks

On a rainy night in June, Ramesh hears frogs croaking loudly round a pond in Lamjung, and next morning finds clumps of jelly with black dots in the water.

a. What is amplexus? **[1]**

b. Explain the path by which sperms leave a male frog's testis to reach the outside, and why his duct is called a urinogenital duct. **[2]**

c. In the breeding season, how could Ramesh tell a male from a female frog by looking at them? Give two features of each. **[2]**

d. A frog has no penis, yet almost all its eggs are fertilized. Explain how amplexus and the eggs' coverings make this possible, and why the jelly is not found on eggs still in the body cavity. **[3]**