# Grade 11 Biology Model Paper 1

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.** Food chains in a forest rarely have more than four or five links. Why?

(i) Top predators are too large to be eaten by anything.
(ii) Decomposers break down the bodies of the top predators.
(iii) So much energy is lost at each step that too little is left to support another level.
(iv) Producers can't make enough food for more than four kinds of consumer.

**b.** In which year was the Ramsar Convention on wetlands signed?

(i) 1964 (ii) 1971 (iii) 1988 (iv) 1992

**c.** A seed bank stores the seeds of rice and wheat dried and frozen at about −18 °C, but keeps mango and litchi as living trees in a field. Why?

(i) Mango and litchi seeds are too large to fit in the store.
(ii) Mango and litchi are not endangered, so their seeds need not be kept.
(iii) Fruit trees can be grown only from grafts, never from seeds.
(iv) Their seeds die if they are dried or frozen.

**d.** What is the study of fishes called?

(i) Herpetology (ii) Malacology (iii) Ichthyology (iv) Limnology

**e.** In a sample of double-stranded DNA, 18% of the bases are thymine. What percentage of the bases are guanine?

(i) 18% (ii) 32% (iii) 36% (iv) 64%

**f.** How does a conservation area, such as the Annapurna Conservation Area, differ from a national park?

(i) It protects only plants, not animals.
(ii) Local people go on living and farming inside it and help to run it.
(iii) It is always smaller than a national park.
(iv) Hunting of any animal is allowed in it under a license.

**g.** In a stream near Dhulikhel, Sudarshan collects an animal with a soft, unsegmented body, a muscular foot on which it creeps, a fold of skin over its back and a coiled shell made by that fold. To which phylum does it belong?

(i) Annelida (ii) Arthropoda (iii) Echinodermata (iv) Mollusca

**h.** In Pasteur's experiment, a flask of boiled broth with an open swan neck stayed clear for months. What happened when he tilted the flask so that the broth ran into the bend of the neck and back?

(i) It stayed clear, because the broth had been boiled.
(ii) It became cloudy with microbes within days.
(iii) It became cloudy only if the neck was then sealed.
(iv) It formed new microbes out of the broth itself.

**i.** The wing of a bat and the wing of a butterfly both carry the animal through the air. These wings are:

(i) homologous organs, because they do the same work
(ii) analogous organs, because they do the same work but are built differently and arose separately
(iii) vestigial organs, because the animals once walked
(iv) homologous organs, because both animals evolved from a common ancestor with wings

**j.** In the 1950s DDT sprayed in the Terai killed almost all the mosquitoes. Years later most of the mosquitoes there were no longer killed by it. Which explanation fits the theory of natural selection?

(i) The mosquitoes learned to avoid the spray and passed this on to their young.
(ii) DDT made the mosquitoes' bodies tougher, and the toughness was inherited.
(iii) A few mosquitoes were already resistant; they survived and bred, so their resistance spread.
(iv) The mosquitoes needed resistance, so new resistant ones appeared.

**k.** Bhumika reads the headline "Humans evolved from chimpanzees". Which statement best judges it?

(i) It is right: the chimpanzee is the ancestor of modern man.
(ii) It is wrong: humans and apes are not related at all.
(iii) It is right, because chimpanzees and humans share a skeleton with the same bones.
(iv) It is wrong: humans and chimpanzees are cousins, both descended from a common ancestor that lived millions of years ago.

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

### Question 2 — 5 marks

**Pemba walks through the forests above Gorkha and finds two kinds of pine: one with long, slender needles in bundles of three, lower down, and one with soft blue-green needles in bundles of five, higher up.**

**a.** Name the two kinds of shoots in *Pinus*, and say on which of them the needles grow. **[2]**

**b.** Identify each of Pemba's two pines by name, with a reason. **[2]**

**c.** Pemba's friend calls the woody pine cone "the pine's fruit". Is she right? Give a reason. **[1]**

**OR**

**Prarthana finds a flat, dark green, forked ribbon-like plant, *Marchantia*, at the foot of a damp wall beside a dhara in Bhaktapur. Small cups on its upper surface are full of green discs.**

**a.** Name the two kinds of structure on the lower surface of the thallus of *Marchantia*, with one function of each. **[2]**

**b.** Prarthana sows one of the green discs from a cup on damp soil. What are the discs called, and how many new plants does one disc grow into? If the parent thallus was male, what will the new plants be? **[2]**

**c.** The patch beside the dhara has spread over the whole wall for years, but it has never formed sporophytes. Every plant in it grew from the gemmae of one thallus. Explain why. **[1]**

## Question 3 — 5 marks

**Ankit's mother makes jaand from millet with murcha, and bakes bread with baker's yeast, *Saccharomyces cerevisiae*.**

**a.** To which division of fungi does yeast belong, and what is the name of the spores it forms in sexual reproduction? **[1]**

**b.** Ankit puts a drop of yeast from a warm sugar solution under a microscope. He sees oval cells, many with a smaller round cell attached at one end, and some in short branched chains. Name the process he is seeing, and the chain of cells. Describe briefly how the small cell forms. **[2]**

**c.** Two yeasts are compared. In yeast X, the zygote formed by conjugation is the only diploid cell; every other cell is haploid. In yeast Y, the diploid cells formed from the zygote bud for many generations, and the haploid cells from the ascospores also bud for many generations. Name the life cycle of each, and say which phase is dominant in each. Which of the two is Ankit's baker's yeast? **[2]**

## Question 4 — 5 marks

**Rojina's school pond in Chitwan is full of water hyacinth, *Eichhornia*, and *Hydrilla*; the school garden has a pot of *Opuntia*.**

**a.** Explain two anatomical adaptations that suit hydrophytes such as *Eichhornia* and *Hydrilla* to life in water. **[2]**

**b.** A section of an *Opuntia* pad shows a very thick cuticle and stomata sunk in pits. To what kind of habitat is the plant adapted, and how do these two features help it? **[1]**

**c.** A new caretaker waters the *Opuntia* every day and sets a pot of *Hydrilla* out of water in the sun. Within weeks the cactus has rotted and the *Hydrilla* has dried up. Explain each result from the plants' adaptations. **[2]**

## Question 5 — 5 marks

**Sabina leaves a glass of milk on a warm kitchen shelf. It holds 100 bacteria that divide every 30 minutes.**

**a.** Define the generation time of bacteria. Name the phase of the bacterial growth curve in which the number of living bacteria stays nearly the same because the cells are only adjusting to the new medium. **[2]**

**b.** Ignoring the lag phase, how many bacteria will the milk hold after 4 hours? **[2]**

**c.** Sabina's grandmother keeps her lapsi pickle in plenty of salt, and it does not spoil for months. Explain why bacteria can't grow in it. **[1]**

## Question 6 — 5 marks

**Diya tests some animals in the school laboratory. Earthworms placed in a lit tray crawl to its dark end; *Euglena* in a dish gather towards moderate light. Then she touches a hot test tube and pulls her hand away before she feels pain.**

**a.** How does innate behavior differ from learned behavior? **[1]**

**b.** Name the kind of taxis shown by the earthworms and by *Euglena*, saying whether each is positive or negative. **[2]**

**c.** Explain why Diya's hand moved before she felt any pain. **[2]**

## Question 7 — 5 marks

**The excretory organs of the earthworm, *Pheretima posthuma*, are many tiny coiled tubes, the nephridia.**

**a.** Name the three kinds of nephridia of *Pheretima*. In which segments are the pharyngeal nephridia found? **[2]**

**b.** Why is the clitellum called the "forest of nephridia"? **[1]**

**c.** Septal nephridia are called the most advanced nephridia of the earthworm. Compare them with integumentary nephridia in how they collect their wastes and where they pour them. **[2]**

**OR**

**Tashi studies a drop of pond water from Rani Pokhari and finds *Paramecium caudatum* swimming in it.**

**a.** *Paramecium* has two kinds of nucleus. Name them and give the function of each. **[2]**

**b.** What is the work of the radiating canals round each contractile vacuole? **[1]**

**c.** Tashi destroys the micronucleus of one *Paramecium* with a fine needle and the macronucleus of another. Predict what will happen to each, with reasons. **[2]**

## Question 8 — 5 marks

**From a field trip, Nischal brings three worm-like animals: a *Planaria* from a stream, an *Ascaris* from a pig's intestine (kept by the vet), and an earthworm from the garden.**

**a.** Classify each animal into its phylum, and name the kind of body cavity it has. **[3]**

**b.** Nischal says, "They are all just worms; their body cavity makes no difference." Do you agree? Give two ways in which the earthworm's true coelom is an advantage. **[2]**

## Question 9 — 5 marks

**Two scientists explain the long neck of the giraffe in two different ways.**

**a.** State Lamarck's theory of inheritance of acquired characters. **[1]**

**b.** Weismann cut off the tails of mice for five generations; not one of the 901 young was born with a shorter tail. What does this show about Lamarck's theory? **[1]**

**c.** Explain the giraffe's long neck according to Lamarck and according to Darwin, and say which explanation is supported by the evidence, with a reason. **[3]**

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

## Question 10 — 8 marks

**Abinash, a farmer in Dang, grows lentil (मसुरो) in his field after the rice harvest. His lentil flowers have a large upper petal, two side petals and two lower petals joined into a boat.**

**a.** Write the floral formula of the family Fabaceae, and name the type of corolla it has. **[2]**

**b.** Explain the meaning of each of these features of the lentil flower and fruit: (i) diadelphous stamens, (ii) marginal placentation, (iii) a legume. **[3]**

**c.** Abinash finds that the rice planted after his lentil crop needs less fertilizer than rice planted after wheat. Explain why, and suggest how he could make the most of this. **[3]**

**OR**

**Two samples of *Spirogyra* from a pond in Kirtipur are under the microscope. In sample P, two filaments lying side by side are joined by many tubes; in sample Q, a single filament has zygospores in every second cell, with a curved tube round the septum beside each.**

**a.** What is conjugation in *Spirogyra*? Why is it called isogamous? **[2]**

**b.** Name the kind of conjugation in sample P, and describe the steps by which its tubes form and its zygospores arise. **[3]**

**c.** Name the kind of conjugation in sample Q. Compare it with that in P: how many filaments take part, which cells are left empty, and what this tells you about the strains of the two samples. **[3]**

## Question 11 — 8 marks

**Shishir stains a squash of an onion root tip and counts 600 cells: 522 in interphase, 45 in prophase, 15 in metaphase, 6 in anaphase and 12 in telophase. The cell cycle of these cells lasts 18 hours.**

**a.** Give three differences between mitosis and meiosis. **[3]**

**b.** From Shishir's count, find the mitotic index, and the time that prophase and anaphase each last. **[3]**

**c.** Shishir's friend says, "Only 13% of the cells are dividing, so most of the root tip is resting." Is "resting" a good word for interphase? Explain, and say what his count shows about the length of interphase. **[2]**

## Question 12 — 8 marks

**Kritika dissects a frog's heart in the laboratory and finds that it has only one ventricle.**

**a.** Name the two extra chambers of the frog's heart that a mammal's heart doesn't have. **[1]**

**b.** Describe the auriculo-ventricular valve of the frog, and explain how the chordae tendineae help it work. **[2]**

**c.** Trace the path of deoxygenated blood from the postcaval vein to the lungs, naming the chambers and vessels it passes through. **[2]**

**d.** With one ventricle, oxygenated and deoxygenated blood could mix. Explain the old and the modern views of how much they mix, say what measurements have shown, and suggest why a single ventricle serves a frog well enough. **[3]**