Grade 9 Optional Science Model Paper 2

MODEL PAPER

Full marks 75 · 2.25 hours

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

All questions are compulsory. Time: 2.25 hours.

A practice paper by Science Playground, made to CDC's Specification Grid 2076, Science (Optional); not an official CDC or exam board paper. Mark it yourself online: the QR code below opens the paper with its answers.

A full practice run of the Optional Science paper: 75 marks in 2 hours 15 minutes, 39 questions, every one compulsory, in four sections. Section A asks for very short answers (1 mark each), Section B short answers (2 marks), Section C answers of 3 marks and Section D long answers (4 marks). Write your answers on paper as in the exam hall, then open each answer and give yourself the marks its scheme allows.

Section A

16 × 1 = 16

1. Write very short answers to the following questions.

a. What are cristae?

b. What is the generation time of a bacterium?

c. What is a gene?

d. What is a keystone species?

e. Who made the first vaccine?

f. What are isobars?

g. What are the temperature and pressure at STP?

h. What is electroplating?

i. Write the IUPAC name of CH_3CH_2OH.

j. Name the alloy of copper and zinc.

k. What is a couple?

l. State the law of conservation of linear momentum.

m. What is the SI unit of radiation dose?

n. Define the absolute refractive index of a medium.

o. What is the angle of dip?

p. What is a syncline?

Section B

13 × 2 = 26

Write short answers to the following questions.

2. Mitochondria and chloroplasts are thought to have been free-living bacteria long ago. Write any two pieces of evidence for this idea. **[2]**

3. Write any two differences between autosomes and sex chromosomes. **[2]**

4. Write any two differences between aerobic and anaerobic decomposition. **[2]**

5. Antibiotics should not be taken for a common cold. Why? **[2]**

6. Write any two differences between Rutherford's atomic model and Bohr's atomic model. **[2]**

7. When brine (a strong solution of sodium chloride) is electrolysed, hydrogen gas forms at the cathode, not sodium. Why? **[2]**

8. Ethanol (molecular mass 46) boils at 78 °C, but propane (molecular mass 44) boils at −42 °C. Why? **[2]**

9. Utensils are made of stainless steel rather than ordinary steel. Write the composition of stainless steel and why it does not rust. **[2]**

10. A fielder draws his hands back while catching a fast cricket ball. Why? **[2]**

11. Syringes are sterilized with gamma rays after they are sealed in plastic packets. Why are gamma rays used? **[2]**

12. A diamond sparkles much more than a piece of glass cut in the same shape. Why? **[2]**

13. A television set can give a dangerous shock if it is opened even after it is unplugged. Why? **[2]**

14. Nepal has many earthquakes but no volcanoes. Why? **[2]**

Section C

7 × 3 = 21

Answer the following questions.

15. Anju looks at a cheek cell under a microscope with a 10× eyepiece and a 40× objective. In a photo taken through the microscope, the cell's image is 24 mm across. What is the real size of the cell in micrometers? **[3]**

16. On average one person with a certain disease infects 12 others where nobody is immune ($R_0 = 12$). How many of the 600 students of a school must be immune for herd immunity to protect the rest? **[3]**

17. Water containing a little dilute sulphuric acid is electrolysed between platinum electrodes in a Hofmann's voltameter. 24 cm³ of hydrogen is collected. **[3]**

i. Write the reactions at the cathode and the anode. (2)

ii. What volume of oxygen is collected in the same time? (1)

18. Write the IUPAC names of: **[3]**

i. $CH_3CH(CH_3)CH_2CH_3$

ii. CH_3COCH_3

iii. $CH_3CH{=}CHCH_3$

19. A microbus starts from rest at a bus stop in Banepa and reaches 10 m/s in 5 s. It runs at 10 m/s for 15 s and then stops uniformly in the next 4 s. Using its velocity–time graph, find: **[3]**

i. its acceleration in the first 5 s (1)

ii. the total distance it travels (2)

20. Two small charged balls, one of +2 μC and the other of −3 μC, are 30 cm apart in air. Calculate the force between them and say whether it is attraction or repulsion. ($k = 9 \times 10^9$ N m²/C²) **[3]**

21. **[3]**

i. The Indian plate moves north at about 5 cm a year. How far, in kilometers, does it move in 10 million years? (2)

ii. A layer of rock 80 km wide is squeezed to 60 km while a fold mountain forms. What is the percentage shortening? (1)

Section D

3 × 4 = 12

Write long answers to the following questions.

22. Shristi grows two patches of *Mucor mucedo* from single spores on opposite sides of a dish of bread. After some days, black warty zygospores appear, but only along the line where the two patches have met. **[4]**

i. Why do the zygospores form only where the patches meet? (1)

ii. Every nucleus of a *Mucor* mycelium is haploid, but the zygospore is diploid. How does the next mycelium become haploid again? (1)

iii. A zygospore can rest for months. How does this help *Mucor*? (1)

iv. Her brother wants to scrape the mold off a slice of bread and eat the rest. Is this safe? Give a reason. (1)

23. Rijan puts a cotton plug soaked in ammonia solution at one end of a long glass tube, 120 cm long, and a plug soaked in concentrated hydrochloric acid at the other end, at the same time. A white ring forms inside the tube after some minutes. **[4]**

i. Write the equation of the reaction that forms the white ring. (1)

ii. Will the ring form nearer the ammonia end or the hydrochloric acid end? Give a reason. (1)

iii. Calculate how far from the ammonia end the ring should form. (NH_3 = 17, HCl = 36.5) (2)

24. Ashish, a fisherman on the Koshi, stands on the bank and looks at a fish in clear water. **[4]**

i. To spear the fish, should he aim at the fish he sees, above it or below it? Give a reason. (1)

ii. A pond near his house is 2.0 m deep. How deep does it look when he looks straight down into it? (μ of water = 4/3) (1)

iii. By how much is the bottom raised? (1)

iv. If he looks at the bottom at a slant instead, will it look deeper or shallower than when he looks straight down? (1)