

SCIENCE EXPLORATION

Sample Question Paper 1

Class IX | 2026-27

Time Allowed: 3 hours

Maximum Marks: 80

General Instructions

1. This paper contains 39 questions in three sections: A Biology, B Chemistry and C Physics. All questions are compulsory.
2. Each section has three internal choices. Attempt only one alternative wherever OR is given.
3. Marks are shown on the right. Show calculations and draw neat labelled diagrams where required.
4. Answer activity questions on paper; you do not need to perform the experiments. Use $g = 10 \text{ m s}^{-2}$ unless otherwise stated.

For all Assertion–Reason questions, use the following answer codes:

- A. Both A and R are true, and R is the correct explanation of A.
- B. Both A and R are true, but R is not the correct explanation of A.
- C. A is true, but R is false.
- D. A is false, but R is true.

SECTION A

(Biology | Questions 1–16 | 30 marks)

1. Which of the following pairs of cell organelles contains DNA? **[1]**
(i) Chloroplasts, Ribosomes (ii) Mitochondria, Nucleus
(iii) Golgi bodies, Ribosomes (iv) Nucleus, Lysosomes
2. If a plant is unable to transport food from leaves to roots which tissue is malfunctioning? **[1]**
(i) Xylem (ii) Phloem
(iii) Epidermis (iv) Sclerenchyma
3. A human cell with 46 chromosomes undergoes meiosis to form gametes. How many chromosomes will each gamete contain? **[1]**
(i) 23 (ii) 46
(iii) 69 (iv) 92
4. Meena and Hari observed an animal in their garden. Hari called it an insect while Meena said it was an earthworm. Choose the correct option which confirms that it is an insect. **[1]**
(i) Bilateral symmetrical body (ii) Body with jointed legs
(iii) Cylindrical body (iv) Body with little segmentation
5. Why does asexual reproduction produce offsprings that are genetically identical to the parent? **[1]**

6. A flower's anthers are removed before it matures. Later, pollen from another plant of the same species is dusted onto its stigma and seeds are produced. Which process has been ensured here? **[1]**

(i) Self-pollination

(ii) Cross-pollination

(iii) Fertilisation

(iv) Tissue culture

7. Two similar animal cells are placed in two different solutions:

Cell X is placed in pure water.

Cell Y is placed in a concentrated salt solution.

Cells are observed after some time. Cell X swells, and Cell Y shrinks. Which statement provides the correct explanation for the above observations? **[1]**

(i) Salt molecules moved into Cell Y, causing it to shrink.

(ii) Water moved into Cell X and more water moved out of Cell Y than the salt solution entered in it.

(iii) Water moved into Cell X and moved out of Cell Y through the cell membrane.

(iv) Solute movement caused osmosis in both cells.

8. Why are flowers that bloom at night white or light in colour as compared to flowers that bloom during the day? **[1]**

9. Arrange the following stages of sexual reproduction in plants in the correct order: **[1]**

(i) Pollen germination on stigma

(ii) Fertilisation

(iii) Pollination

(iv) Formation of zygote

10. A. Two students, Renu and Rohit, were having a discussion on the plastids. Renu emphasised that all parts of the plants, even roots, contain plastids. However, Rohit did not agree with the statement and told her that plastids are absent in plant roots since the roots are underground and do not need to perform photosynthesis. Who is correct? Justify your answer. **[2]**

OR

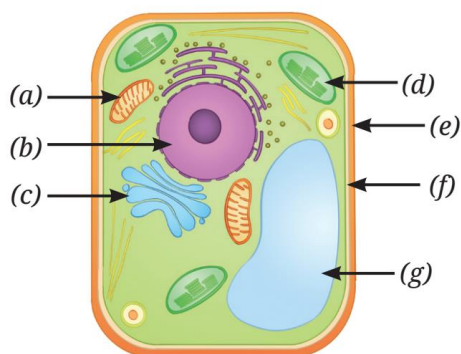
B. What outcome do you expect, if all the mitochondria are removed from a eukaryotic cell?

11. During a Tiwari Academy science workshop, students compare a flexible leaf stalk with a tough coconut fibre. Identify the supporting tissue most associated with each, and give one structural feature that explains its behaviour. **[2]**

12. Why do vegetatively propagated plants tend to be more vulnerable to diseases than sexually reproduced plants? **[2]**

13. Study the cell in Figure and answer the following questions.

[3]



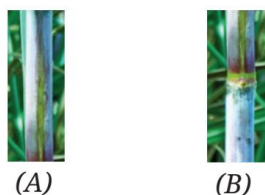
(i) Is this a plant cell or an animal cell? Give one visible feature supporting your answer. [1]

(ii) Name part (d). If this cell is kept in darkness, can its mitochondria replace the food-making function of part (d)? Explain. [1]

(iii) Predict the direction of water movement and the change in the vacuole when the cell is placed in a concentrated salt solution. [1]

14. Two specimens are multicellular and have cell walls. Specimen X contains chlorophyll and makes its own food; specimen Y lacks chlorophyll and absorbs nutrients from decaying leaves. Place X and Y in their kingdoms. Explain the mode of nutrition of each specimen and how it distinguishes the two kingdoms. [3]

15. A. Sohan designed an experiment for the regeneration of sugarcane, where he used cuttings to grow sugarcane. He used two types of cuttings, type 'A' and type 'B' (Figure). After a few weeks, type 'B' cuttings sprouted and developed into sugarcane plants, whereas the type 'A' cuttings did not sprout. [4]



(i) Why were the type 'B' cuttings able to grow as sugarcane but type 'A' could not? [1]

(ii) What difference was present in type 'B' compared to type 'A'? [1]

(iii) What observation or measurement was made to determine whether this change had an effect? [1]

(iv) What parameters should be kept the same for both types of cuttings to ensure a fair comparison? [1]

OR

B. Answer the following questions.

(i) Aamrapali observed that a young mango sapling's stem bends flexibly during monsoon winds and does not break. Which tissue is responsible for this flexibility? Predict and provide your explanation of the impact if the existing tissue was replaced by sclerenchyma. [2]

(ii) Vibha claims to her friend Neha that, "Meristematic cells are located only at the root and shoot apices". What do you think about this statement? What question can Neha ask Vibha to help her understand further if the statement is incorrect? [2]

16. A. Answer the following questions. [5]

(i) Both pteridophytes and bryophytes lack flowers and seeds, yet they are placed in different groups. Explain this classification using their key features. [3]

(ii) In the classification hierarchy, which group — class or genus — has fewer members but more features in common? Explain your answer. [2]

OR

B. Answer the following questions.

(i) You find an unlabelled slide of a single-celled organism that has a well-defined nucleus and multiple cilia. Which group would it most likely belong to? Give reasons. [2]

(ii) Viruses were studied in earlier classes. Why are they not placed in any of the five kingdoms? Give reasons. [3]

SECTION B

(Chemistry | Questions 17–29 | 25 marks)

17. An atom ^{70}X has 31 electrons. How many neutrons are there in its nucleus? [1]

18. You want to design a new ionic compound, where the total positive charge is 6+ and the total negative charge is 6-. Which of the following combinations gives the correct number of ions? [1]

(i) 2Al^{3+} and 3Cl^{-}

(ii) 3Mg^{2+} and 1PO_4^{3-}

(iii) 2Fe^{3+} and 3O^{2-}

(iv) 3Ca^{2+} and 2SO_4^{2-}

19. An atom has 79 protons and a mass number of 197. Calculate (i) the number of neutrons, and (ii) the number of electrons. [1]

20. Calcium forms Ca^{2+} ions and oxygen forms O^{2-} ions. Which formula represents their electrically neutral compound? [1]

(i) Ca_2O

(ii) CaO

(iii) CaO_2

(iv) Ca_2O_3

21. Electrons move around the nucleus in orbits. Why do they not fly away from the atom? Explain what keeps them attracted to the nucleus. [1]

22. Assertion (A): The discovery of subatomic particles helped in understanding the atomic structure.

Reason (R): The number of electrons is equal to the number of protons in an atom. [1]

23. Assertion (A): Solutions do not exhibit the Tyndall effect.

Reason (R): The particles in solutions are larger than 100 nm, so they cannot scatter light. [1]

24. Assertion (A): Copper sulfate conducts electricity in the molten state but not in the solid state.

Reason (R): Copper and sulfate ions are fixed in the lattice in molten state, while in solid state they can move freely. [1]

25. 5.3 g of sodium carbonate and 6.0 g of acetic acid react to produce 2.2 g of carbon dioxide, 0.9 g of water, and 8.2 g of sodium acetate. Verify whether the law of conservation of mass is valid. [2]

26. A. A brass alloy contains 70% copper by mass. Calculate the quantities of copper and zinc present in 120 g of brass. [3]

OR

B. A cake recipe uses dry ingredients, namely 75 g of sugar for 420 g of all-purpose flour and 5 g of sodium hydrogencarbonate. Express the concentration of each component in the mixture using an appropriate method.

27. If a species has 11 protons, 12 neutrons and 10 electrons then [3]

(i) what is its atomic number and mass number? [1]

(ii) is it neutral, a cation or an anion? Explain. [1]

(iii) write its electronic configuration. (iv) name the species. [1]

28. A. Aman was discussing the structure of atom with his classmates. During the discussion, he learnt that an element X has a mass number of 35 and contains 18 neutrons. Based on this information, answer the following questions: [4]

(i) How many electrons and protons does element X have? (ii) What is its atomic number? [1]

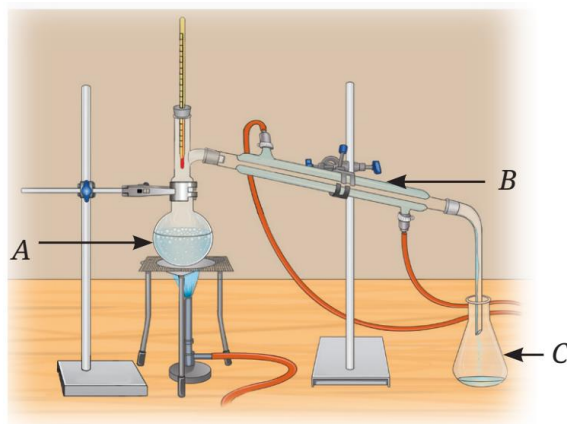
- (iii) Identify the element X. (iv) Write its electronic configuration. [1]
 (v) How many valence electrons does it have? [1]
 (vi) What will be the mass number if two neutrons are added to its nucleus? (vii) What will be the relation of X with the new atom? [1]

OR

B. Explain and arrange the following statements in the correct chronological order to show how atomic models have evolved over time.

- (i) Bohr's model proposed that electrons move in fixed orbits around the nucleus, each with a definite energy.
 (ii) Thomson's model depicted the atom as a 'plum pudding' with electrons embedded in a sphere of positive charge.
 (iii) Rutherford's model proposed that atoms have a dense central nucleus.
 (iv) Dalton's model described atoms as indivisible particles.

29. A. Examine Figure. [5]



S.

- (i) Identify the separation technique marked as 'S'. [1]
 (ii) Label the apparatus A, B and C. [3]
 (iii) Which of the following mixtures can be separated by the technique identified above? Use the data given in the following Table Mixtures:
 (a) water — acetone (b) water — salt
 (c) acetone — alcohol (d) sand — salt
 (e) alcohol — chloroform (f) alcohol — benzene [1]

Table: Boiling points of some compounds

Solvent	Water	Acetone	Alcohol	Chloroform	Benzene
Temperature (°C)	100 °C	56 °C	78 °C	61 °C	80 °C

OR

B. Three students, A, B and C, are preparing sugar solutions for an experiment: Student A dissolves 20 g of sugar in 80 g of water.

Student B dissolves 20 g of sugar in 100 g of water.

Student C dissolves 30 g of sugar in 80 g of water.

(i) Calculate the mass percentage (% m/m) concentration of sugar in each student's solution. [3]

(ii) Whose solution is the most concentrated? Explain why. [2]

SECTION C

(Physics | Questions 30–39 | 25 marks)

30. When a ball thrown upwards reaches its highest point, tick which of the following statement(s) are correct? [1]

(i) The force acting on the ball is zero.

(ii) The acceleration of the ball is zero.

(iii) Its kinetic energy is zero.

(iv) Its potential energy is maximum.

31. Choose the most appropriate option to describe the role of biogeochemical cycles in an ecosystem. [1]

(i) To provide food directly to all organisms.

(ii) To recycle essential nutrients between biotic and abiotic components.

(iii) To create new elements for use by living things.

(iv) To remove pollutants and toxins from the organism.

32. Assertion (A): Two horizontal forces of 18 N and 11 N acting in opposite directions on a trolley produce a resultant force of 7 N towards the 18 N force. Reason (R): Oppositely directed forces are subtracted to find their resultant magnitude, which acts in the direction of the larger force. [1]

33. Estimate how many litres of air you breathe in one day. Start by estimating how many breaths you take per minute, and the volume of one breath. Your aim is not to find an exact answer, but a reasonable estimate. [2]

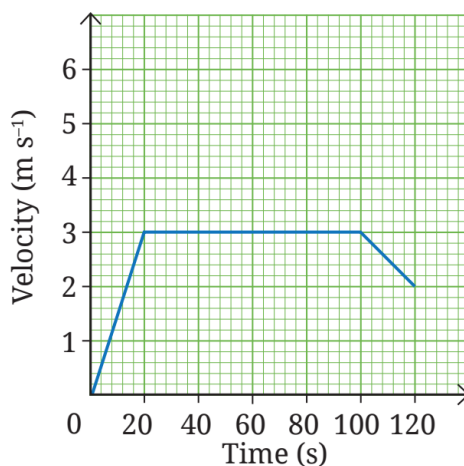
34. A. A ship searching for a sunken ship sent a sonar signal and detected an echo after 5 s. If ultrasonic wave travels at 1525 m s^{-1} in seawater, approximately how far down in the ocean is the wreckage of the sunken ship located? [2]

OR

B. A source produces a sound wave of wavelength 3.44 m. If the wave travels with a speed of 344 m s^{-1} find its time period.

35. A bullet of mass 50 g moving with a speed of 100 m s^{-1} enters a heavy stationary wooden block and stops after penetrating a distance of 50 cm. Estimate the stopping force acting on the bullet (assume that the bullet undergoes constant acceleration within the block). [3]

36. The velocity-time graph from 0 s to 120 s for a cyclist is shown in Figure. Shade the areas (in different colours) representing the displacement of the cyclist [3]



(i) while cyclist is moving with constant velocity.

(ii) when the velocity of cyclist is decreasing. [1]

Also, calculate the displacement and average acceleration in the 120 s time interval. [2]

37. Answer the following questions. [3]

(a) A weightlifter lifts a 75 kg mass by 2 m in 5 seconds. How much power would she require for this task? [2]

(b) Take a ring, such as an adhesive tape ring and one marble.

Place the ring flat on a smooth surface and throw the marble inside the ring in a way that it rotates along the inner boundary of the ring (Figure).

Predict what will happen if you lift the ring while the marble is moving. [1]



38. A. At noon on a sunny day, a class observes air moving from a valley up the mountain slopes. A student predicts that the air will still flow upslope several hours after sunset. Evaluate this prediction. [4]

(i) Explain why air above the sunlit slopes rises. [1]

(ii) Explain why air from the valley moves upslope during the day. [1]

(iii) State whether the prediction is correct, describe the expected night-time airflow and name the breeze. [2]

OR

B. On a clear summer afternoon, students at a beach feel a breeze blowing from the sea towards the land. A student expects the same direction of airflow late at night. Evaluate this prediction.

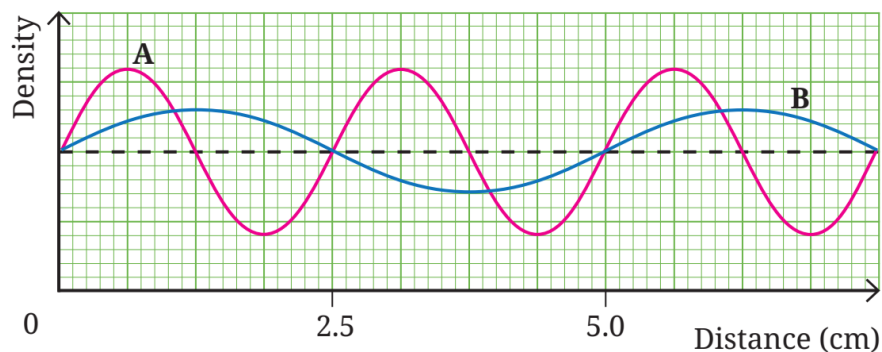
(i) Explain why air over land rises in the afternoon. [1]

(ii) Explain why air moves from sea to land during the afternoon. [1]

(iii) Evaluate the prediction, describe the expected night-time airflow and name the breeze. [2]

39. Answer the following questions. [5]

(a) The graphical representation of two sound waves A and B propagating at the same speed of 345 m s^{-1} is shown in Figure. What is the wavelength of each of them? Also, calculate their frequencies. [3]



(b) A. Fill in the blanks. [2]

(i) Work done = _____ $\times$ _____ (in the direction of force). [1]

(ii) The potential energy of an object of mass m at a small height h from the Earth's surface is _____. [1]

OR

B. State whether True or False.

(i) Work is said to be done when a force is applied, even if the object does not move.

(ii) Lifting a bucket vertically upward results in positive work done on the bucket.

(iii) A motionless stretched rubber band has kinetic energy.

(iv) Energy can change from one form to another.