# SAMPLE PAPER 1

## SCIENCE - CLASS IX

### Exploration | Session 2026-27

**Maximum Marks: 80** **Time Allowed: 3 Hours**

**General Instructions**

1. This question paper consists of 39 questions in five sections.
2. All questions are compulsory. Internal choice is provided in some questions; attempt only one alternative.
3. Section A contains 20 objective-type questions of 1 mark each.
4. Section B contains 6 Very Short Answer questions of 2 marks each.
5. Section C contains 7 Short Answer questions of 3 marks each.
6. Section D contains 3 Long Answer questions of 5 marks each.
7. Section E contains 3 case-based/data-based questions of 4 marks each.
8. Draw neat labelled diagrams wherever required and show complete working in numerical questions.

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## Section A (1 Mark Each)

*(Questions 1-16 are multiple-choice questions. Questions 17-20 are Assertion-Reason questions.)*

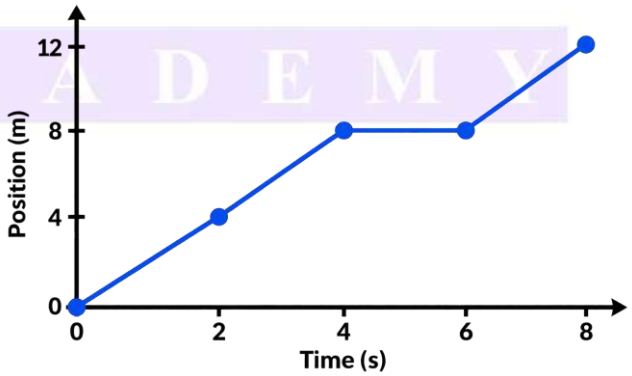
**1.** A student uses a model to estimate the time taken by a bicycle to reach home. Which detail is most reasonable to ignore in the first model?
(a) Distance to home
(b) Average speed
(c) Major traffic stops
(d) Colour of the bicycle

**2.** A plant cell is placed in a concentrated sugar solution and the cell membrane pulls away from the cell wall. Which process is mainly responsible?
(a) Diffusion of sugar
(b) Osmosis of water out of the cell
(c) Active transport
(d) Water entering the vacuole

**3.** Which tissue is correctly matched with its function?
(a) Xylem - transport of food
(b) Phloem - transport of water only
(c) Tendon - connects muscle to bone
(d) Ligament - connects muscle to muscle

**4.** Study the position-time graph shown below. During which interval is the object at rest?

(a) 0-2 s
(b) 2-4 s
(c) 4-6 s
(d) 6-8 s

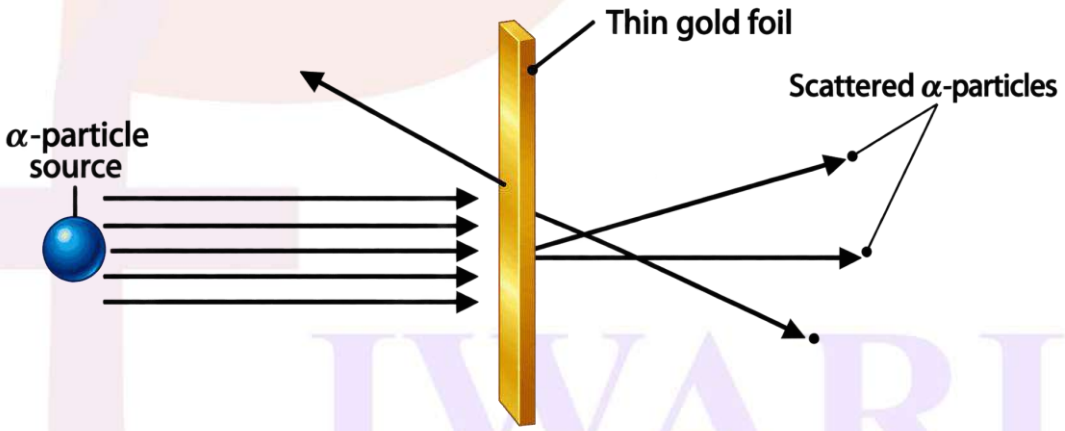


**5.** A student wants to separate the coloured components present in black ink. Which method is most suitable?
(a) Sublimation
(b) Paper chromatography
(c) Separating funnel
(d) Crystallization

**6.** The same force is applied separately to carts of masses 2 kg and 4 kg. Compared with the 4 kg cart, the acceleration of the 2 kg cart is:
(a) half
(b) the same
(c) twice
(d) four times

**7.** A student carries a school bag horizontally at constant height. The upward force exerted by the student does zero mechanical work on the bag because:
(a) the bag has no mass
(b) force is perpendicular to displacement
(c) force is smaller than weight
(d) displacement is zero

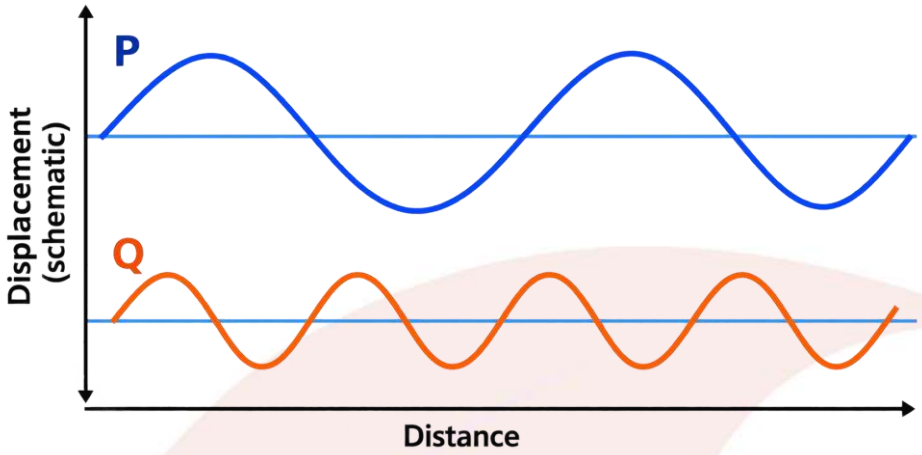
**8.** The schematic below represents Rutherford's alpha-particle scattering experiment. Which observation led to the conclusion that the positive charge and most of the mass are concentrated in a tiny nucleus?




(a) Most particles passed straight through
(b) Some particles underwent large deflections
(c) Gold foil was very thin
(d) Alpha particles were positively charged

**9.** Which pair is most likely to form an ionic compound by transfer of electrons?
(a) Sodium and chlorine
(b) Hydrogen and chlorine
(c) Oxygen and oxygen
(d) Carbon and chlorine

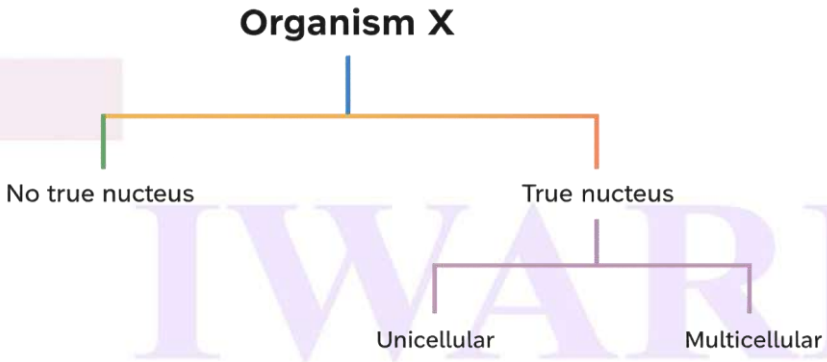
**10.** Two sound waves P and Q are shown below. Which wave has the higher frequency?




(a) P
(b) Q
(c) Both have the same frequency
(d) Cannot be determined

**11.** Which statement correctly describes meiosis?
(a) It doubles chromosome number in gametes
(b) It produces gametes with half the chromosome number
(c) It produces only identical body cells
(d) It occurs only after fertilization

**12.** Use the classification flow shown below. Which branch represents prokaryotic organisms?




(a) Organisms with no true nucleus
(b) Eukaryotic unicellular organisms only
(c) Eukaryotic multicellular organisms only
(d) All organisms with cell walls

**13.** Which process directly restores oxygen to the atmosphere on a large scale?
(a) Respiration
(b) Combustion
(c) Photosynthesis
(d) Decomposition

**14.** Which organelle is correctly matched with its function?
(a) Ribosome - protein synthesis
(b) Lysosome - photosynthesis
(c) Mitochondrion - hereditary information only
(d) Golgi apparatus - ATP production

**15.** An object moves with constant speed in a circular path. Which statement is correct?
(a) Velocity is constant
(b) Acceleration is zero
(c) Direction of velocity changes continuously
(d) Displacement after half a revolution is zero

**16.** A beam of light becomes visible while passing through a sample because its particles scatter light. The sample is most likely:
(a) a true solution only
(b) a colloid or suspension
(c) a pure solvent only
(d) an alloy only

**For Questions 17-20, choose:**
**(a) Both A and R are true and R correctly explains A;**
**(b) Both A and R are true but R does not explain A;**
**(c) A is true but R is false;**
**(d) A is false but R is true.**

**17.** Assertion (A): A moving object can continue with constant velocity even when no net force acts on it.
Reason (R): According to Newton's first law, a net force is required to change velocity.

**18.** Assertion (A): A fixed pulley can make lifting a load more convenient even when its ideal mechanical advantage is 1.
Reason (R): A fixed pulley changes the direction of the applied effort.

**19.** Assertion (A): Isotopes of an element have similar chemical properties.
Reason (R): Isotopes have the same atomic number and hence the same electronic configuration.

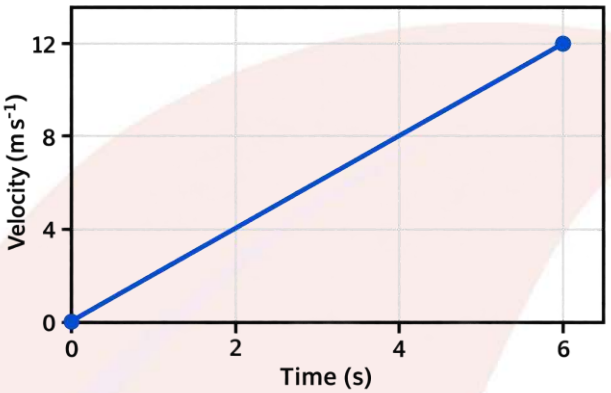
**20.** Assertion (A): Solid sodium chloride does not conduct electricity.
Reason (R): In the solid state, its ions are fixed in position and are not free to move.

## Section B (2 Marks Each)

*(Questions 21-26 are Very Short Answer questions.)*

**21.** A potato strip gains mass in plain water but loses mass in a concentrated salt solution. Explain both observations using osmosis.

**22.** Study the velocity-time graph of a cyclist.




(a) Calculate the acceleration of the cyclist.
(b) Calculate the displacement during the 6 s interval.

**23.** A mixture contains two miscible liquids P and Q with boiling points 60°C and 90°C respectively. Name a suitable method of separation and explain why it is appropriate.

**24.** Why does a cricket fielder move the hands backward while catching a fast-moving ball? Explain using the idea of change in momentum and stopping time.

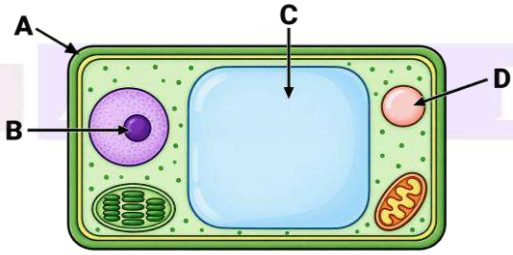
**25.** A machine lifts a load of 300 N by applying an effort of 100 N. Calculate its mechanical advantage. Does this mean the machine creates energy? Give a reason.

**26.** An atom has atomic number 17 and mass number 37. Find the number of protons, electrons and neutrons.

## Section C (3 Marks Each)

*(Questions 27-33 are Short Answer questions.)*

**27.** Study the simplified plant cell shown below.



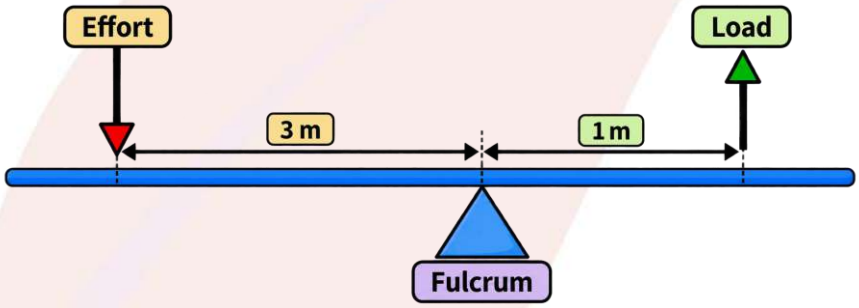

(a) Identify the structures labelled A, B, C and D.
(b) State one function of any two labelled structures.
(c) Which labelled structure is absent in an animal cell but present in this plant cell?

**28.** A car moving at 20 m/s is brought to rest uniformly in 5 s. Calculate its acceleration and distance travelled before stopping. Also state what the slope of a velocity-time graph represents.

**29.** A mixture contains camphor, sand and common salt. Describe a sequence of physical separation methods to obtain the three components separately. State the physical property used at each stage.

**30.** Two boxes of masses 2 kg and 3 kg are connected by a light string and pulled on a frictionless horizontal surface by a force of 20 N. Calculate the acceleration of the system. Explain why the tension is an internal force when both boxes are treated as one system.

**31.** The lever shown below is balanced. The effort arm is 3 m and the load arm is 1 m.




(a) If the load is 180 N, calculate the effort.
(b) Calculate the mechanical advantage.
(c) Identify the class of lever shown.

**32.** Element X has electronic configuration 2, 8, 2 and element Y has electronic configuration 2, 8, 7. State their valencies, explain how they form an ionic compound and write its formula.

**33.** A sound wave has frequency 500 Hz and wavelength 0.68 m. Calculate its speed and time period. Why can the sound not travel through a vacuum?

## Section D (5 Marks Each)

*(Questions 34-36 are Long Answer questions. Internal choice is provided.)*

**34.**

(a) Differentiate among parenchyma, collenchyma and sclerenchyma on the basis of structure and function.
(b) Distinguish between tendon and ligament and state one function of each.

**OR**

(a) Compare skeletal, smooth and cardiac muscles on the basis of structure and control.
(b) Name the main parts of a neuron and explain how nervous tissue helps coordinate movement.

**35.**

(a) Explain pollination and fertilisation in a flowering plant. Describe what happens to the ovule and ovary after fertilisation.
(b) Distinguish between external and internal fertilisation with one example of each.

**OR**

(a) Explain ovulation, fertilisation and implantation in humans.

(b) State any two methods of contraception and explain how each helps prevent pregnancy.

**36.**

(a) Why is classification of living organisms necessary? State three criteria that can be used to classify organisms.

(b) Distinguish between prokaryotic and eukaryotic organisms using any two features.

**OR**

(a) Explain how the major groups of plants show increasing structural complexity from simpler forms to flowering plants.

(b) State two major differences between invertebrates and vertebrates.

## Section E (4 Marks Each)

*(Questions 37-39 are case-based/data-based questions with sub-parts.)*

**37.** Riya is studying two atoms, P and Q. Atom P has atomic number 12 and mass number 24. Atom Q has atomic number 17 and mass number 35. She wants to predict their electronic configurations and how they may combine.

(a) Write the number of protons, electrons and neutrons in atom P.

(b) Write the electronic configuration and valency of atom P.

(c) Write the electronic configuration and valency of atom Q.

(d) Predict the formula of the ionic compound formed by P and Q.

**38.** Marine scientists use SONAR to measure ocean depth. In one observation, an ultrasonic pulse returns to the ship after 2.0 s. The speed of sound in seawater is 1500 m/s. At the same time, scientists are studying how increasing atmospheric carbon dioxide affects ocean water.

(a) State the full form of SONAR.

(b) Calculate the ocean depth at that location.

(c) Why is the measured time divided by 2 while calculating depth?

(d) State one possible effect of excessive atmospheric $CO_2$ on marine ecosystems.

**39.** A farming region receives heavy monsoon rain. Excess fertiliser from fields is washed into a nearby lake. Trees are also being removed from the surrounding area. After some months, a dense algal bloom appears and fish deaths increase.

(a) Name the process in which excessive nutrients cause algal blooms.

(b) Explain why fish may die after a dense algal bloom.

(c) State one effect of deforestation on the local water cycle.

(d) Suggest one practical action that can help restore environmental balance in the region.