

CBSE Class IX Science (2024-25) - Official Structure

Unit-wise Weightage (80 Marks Theory)

Unit	Topic	Marks	Chapters (NCERT)
I	Matter – Its Nature and Behaviour	25	Ch 1, 2, 3, 4
II	Organization in the Living World	22	Ch 5, 6, 7
III	Motion, Force and Work	27	Ch 8, 9, 10, 11, 12
IV	Our Environment & Food Resources	6	Ch 13, 15*
Total		80	(Ch 14: Natural Resources NOT assessed in year-end exam)

Question Paper Pattern (39 Questions)

- Section A: 20 MCQs × 1 mark = 20 marks
- Section B: 6 Very Short Answer (VSA) × 2 marks = 12 marks
- Section C: 7 Short Answer (SA) × 3 marks = 21 marks
- Section D: 3 Long Answer (LA) × 5 marks = 15 marks
- Section E: 3 Case-Based/Application × 4 marks = 12 marks
- Total: 80 marks | Duration: 3 hours



QUESTION PAPER SET 1

CBSE CLASS IX SCIENCE (086)
Annual Examination 2024-25
Time: 3 Hours | Maximum Marks: 80

General Instructions:

1. This question paper consists of 39 questions in 5 sections (A to E).
2. All questions are compulsory. Internal choice is provided in some questions.
3. Section E contains case-based questions.

SECTION A (20 Marks)

(Multiple Choice Questions – 1 mark each)

1. Which of the following is NOT a characteristic property of particles of matter?
 - (a) Particles have space between them
 - (b) Particles are stationary
 - (c) Particles attract each other
 - (d) Particles are very small
2. The process of conversion of solid directly into vapour without passing through liquid state is called:
 - (a) Evaporation
 - (b) Sublimation
 - (c) Condensation
 - (d) Fusion
3. The atomicity of phosphorus molecule is:
 - (a) 2
 - (b) 3
 - (c) 4
 - (d) 8
4. According to Dalton's atomic theory, atoms of a given element are:
 - (a) Different in mass
 - (b) Identical in all respects
 - (c) Divisible
 - (d) Compound particles
5. Which subatomic particle was discovered by J.J. Thomson?
 - (a) Proton
 - (b) Neutron
 - (c) Electron
 - (d) Nucleus
6. The cell organelle known as the "powerhouse of the cell" is:
 - (a) Ribosome
 - (b) Mitochondria
 - (c) Golgi apparatus
 - (d) Endoplasmic reticulum
7. Which tissue provides flexibility in plants?
 - (a) Parenchyma
 - (b) Collenchyma
 - (c) Sclerenchyma
 - (d) Xylem
8. The scientific name of mango is *Mangifera indica*. The first word represents:
 - (a) Species
 - (b) Genus
 - (c) Family
 - (d) Order

9. If a body covers equal distances in equal intervals of time, its motion is:
- (a) Non-uniform
 - (b) Accelerated
 - (c) Uniform
 - (d) Retarded
10. The SI unit of acceleration is:
- (a) m/s
 - (b) m/s^2
 - (c) km/h
 - (d) m^2/s
11. Newton's first law of motion is also called:
- (a) Law of gravitation
 - (b) Law of inertia
 - (c) Law of action-reaction
 - (d) Law of momentum
12. The gravitational constant G has the value:
- (a) 9.8 m/s^2
 - (b) $6.67 \times 10^{-11} \text{ Nm}^2/\text{kg}^2$
 - (c) $6.67 \times 10^{11} \text{ Nm}^2/\text{kg}^2$
 - (d) 9.8 N
13. Work done by a force is zero when the angle between force and displacement is:
- (a) 0°
 - (b) 90°
 - (c) 180°
 - (d) 45°
14. The energy possessed by a body due to its motion is called:
- (a) Potential energy
 - (b) Kinetic energy
 - (c) Heat energy
 - (d) Chemical energy
15. Sound waves are:
- (a) Transverse waves
 - (b) Electromagnetic waves
 - (c) Longitudinal waves
 - (d) Both (a) and (b)
16. The audible range of human ear is:
- (a) 20 Hz to 2000 Hz
 - (b) 20 Hz to 20,000 Hz
 - (c) 200 Hz to 2000 Hz
 - (d) 2000 Hz to 20,000 Hz
17. Which disease is caused by a virus?
- (a) Tuberculosis
 - (b) Typhoid
 - (c) Common cold
 - (d) Cholera

18. Antibiotics work against:
- (a) Viral infections
 - (b) Bacterial infections
 - (c) Both (a) and (b)
 - (d) Neither (a) nor (b)
19. Which nutrient is essential for muscle building?
- (a) Carbohydrates
 - (b) Fats
 - (c) Proteins
 - (d) Vitamins
20. Cross-breeding of two different varieties of plants is called:
- (a) Hybridization
 - (b) Manuring
 - (c) Weeding
 - (d) Threshing

SECTION B (12 Marks)

(Very Short Answer Questions – 2 marks each)

21. Differentiate between evaporation and boiling. (NCERT Ch 1, p. 6-7)
22. Calculate the molecular mass of $CaCO_3$. (Atomic masses: Ca = 40 u, C = 12 u, O = 16 u) (NCERT Ch 3, p. 32)
23. Why are lysosomes called "suicidal bags"? (NCERT Ch 5, p. 63)
24. Define uniform circular motion. Is it an accelerated motion? Give reason. (NCERT Ch 8, p. 102)
25. State Newton's third law of motion with an example. (NCERT Ch 9, p. 117)
26. What is the difference between kinetic energy and potential energy? Give one example of each. (NCERT Ch 11, p. 149-150)

SECTION C (21 Marks)

(Short Answer Questions – 3 marks each)

27. Explain the interconversion of states of matter with the help of a labelled diagram. (NCERT Ch 1, p. 8-9)
28. (a) What is a mixture?
- (b) Differentiate between homogeneous and heterogeneous mixtures with one example each.
 - (c) Give one example of a colloid. (NCERT Ch 2, p. 15-18)
29. Calculate the number of moles in 5.6 L of oxygen gas at STP. (Given: Molar volume at STP = 22.4 L) (NCERT Ch 3, p. 35)
30. Draw a labelled diagram of a plant cell. Mention any two differences between plant and animal cells. (NCERT Ch 5, p. 56-58)
31. Describe three types of muscle tissues found in human body with their locations. (NCERT Ch 6, p. 74-76)

32. A car accelerates uniformly from 18 km/h to 36 km/h in 5 seconds. Calculate:
(i) Acceleration
(ii) Distance covered
(Show all steps with proper units) (NCERT Ch 8, p. 109)
33. Define work. Derive the expression for work done when a force acts on a body at an angle θ with displacement. (NCERT Ch 11, p. 148)

SECTION D (15 Marks)

(Long Answer Questions – 5 marks each)

34. (a) State the postulates of kinetic theory of matter.
(b) Explain why gases exert pressure on the walls of the container.
(c) Why does the temperature remain constant during change of state? (NCERT Ch 1, p. 3-5)
35. (a) What is an atom?
(b) Explain Rutherford's α -particle scattering experiment with a labelled diagram.
(c) Write any two limitations of Rutherford's model of atom. (NCERT Ch 4, p. 41-44)
36. (a) State and prove the law of conservation of momentum.
(b) A gun of mass 5 kg fires a bullet of mass 50 g with a velocity of 200 m/s. Calculate the recoil velocity of the gun. (NCERT Ch 9, p. 124-126)

SECTION E (12 Marks)

(Case-Based/Application Questions – 4 marks each)

37. Read the following passage and answer the questions:

Riya observed that when she added salt to water, it dissolved completely forming a transparent solution. However, when she added sand to water, it settled down at the bottom after some time.

- (a) What type of mixture is formed when salt is added to water?
(b) What type of mixture is formed when sand is added to water?
(c) How can the sand-water mixture be separated? Name the technique.
(d) Why does salt dissolve in water but sand does not? (NCERT Ch 2, p. 19-21)
38. Study the velocity-time graph below and answer:
[Imagine a v-t graph showing: 0-4s: uniform acceleration from 0 to 12 m/s; 4-8s: constant velocity 12 m/s; 8-12s: uniform deceleration to 0 m/s]
- (a) Calculate acceleration in the first 4 seconds.
(b) Calculate distance covered in 4 to 8 seconds.
(c) What is the nature of motion between 8-12 seconds?
(d) Total distance covered in 12 seconds. (NCERT Ch 8, p. 107-108)
39. Read the case and answer:
A farmer wants to improve crop production in his field. He is considering using chemical fertilizers, organic manures, and hybrid seeds.
- (a) What is hybridization in crops?
(b) Give two advantages of using organic manures over chemical fertilizers.

(c) Name two macronutrients required by plants.

(d) What is crop rotation? How does it help in maintaining soil fertility? (NCERT Ch 15, p. 208-210)

✓ ANSWER KEY - SET 1

SECTION A

1. (b) Particles are stationary
2. (b) Sublimation
3. (c) 4 (P_4 molecule)
4. (b) Identical in all respects
5. (c) Electron
6. (b) Mitochondria
7. (b) Collenchyma
8. (b) Genus
9. (c) Uniform
10. (b) m/s^2
11. (b) Law of inertia
12. (b) $6.67 \times 10^{-11} \text{ Nm}^2/\text{kg}^2$
13. (b) 90°
14. (b) Kinetic energy
15. (c) Longitudinal waves
16. (b) 20 Hz to 20,000 Hz
17. (c) Common cold
18. (b) Bacterial infections
19. (c) Proteins
20. (a) Hybridization

SECTION B

21. Evaporation vs Boiling:

- Evaporation occurs only at surface; boiling occurs throughout liquid [[NCERT Ch 1, p. 6]]
- Evaporation occurs at any temperature; boiling occurs at fixed temperature (boiling point) [[NCERT Ch 1, p. 7]]

22. Molecular mass of $CaCO_3$:

$$= 40 + 12 + (3 \times 16) = 40 + 12 + 48 = 100 \text{ u} \text{ [[NCERT Ch 3, p. 32]]}$$

23. **Lysosomes** contain digestive enzymes that can break down cellular components. When a cell is damaged, lysosomes may burst and digest the cell itself—hence "suicidal bags". [[NCERT Ch 5, p. 63]]
24. **Uniform circular motion:** Motion in a circular path with constant speed. **Yes**, it is accelerated because direction of velocity changes continuously (centripetal acceleration). [[NCERT Ch 8, p. 102]]
25. **Newton's third law:** "For every action, there is an equal and opposite reaction."
Example: When we walk, our foot pushes backward on ground (action); ground pushes us forward

(reaction). [[NCERT Ch 9, p. 117]]

26. **Kinetic energy:** Energy due to motion (e.g., moving car). **Potential energy:** Energy due to position/configuration (e.g., water in dam). [[NCERT Ch 11, p. 149-150]]

SECTION C

27. **Interconversion diagram** should show:

Solid $\rightleftharpoons$ Liquid (melting/freezing)

Liquid $\rightleftharpoons$ Gas (vaporization/condensation)

Solid $\rightleftharpoons$ Gas (sublimation/deposition)

Explanation: Change of state occurs due to gain/loss of heat energy affecting intermolecular forces. [[NCERT Ch 1, p. 8-9]]

28. (a) **Mixture:** Combination of two or more substances not chemically combined.

(b) **Homogeneous:** Uniform composition (e.g., salt water); **Heterogeneous:** Non-uniform (e.g., sand-water)

(c) Milk, fog, etc. [[NCERT Ch 2, p. 15-18]]

29. **Moles of O_2 :**

At STP, 22.4 L = 1 mole

$$\therefore 5.6 \text{ L} = \frac{5.6}{22.4} = 0.25 \text{ moles} \text{ [[NCERT Ch 3, p. 35]]}$$

30. **Plant cell diagram** must show: cell wall, chloroplast, large vacuole.

Differences: (i) Plant cells have cell wall; animal cells don't. (ii) Plant cells have chloroplasts; animal cells don't. [[NCERT Ch 5, p. 56-58]]

31. **Muscle tissues:**

(i) Striated/Skeletal: Attached to bones (voluntary)

(ii) Smooth: In alimentary canal, blood vessels (involuntary)

(iii) Cardiac: Heart only (involuntary, branched) [[NCERT Ch 6, p. 74-76]]

32. **Given:** $u = 18 \text{ km/h} = 5 \text{ m/s}$, $v = 36 \text{ km/h} = 10 \text{ m/s}$, $t = 5 \text{ s}$

$$(i) a = \frac{v-u}{t} = \frac{10-5}{5} = 1 \text{ m/s}^2$$

$$(ii) s = ut + \frac{1}{2}at^2 = (5 \times 5) + \frac{1}{2} \times 1 \times 5^2 = 25 + 12.5 = 37.5 \text{ m} \text{ [[NCERT Ch 8, p. 109]]}$$

33. **Work:** Product of force and displacement in direction of force.

$$W = F \cdot s \cdot \cos \theta$$

Derivation: Component of force along displacement = $F \cos \theta$

$$\therefore W = (F \cos \theta) \times s = Fs \cos \theta \text{ [[NCERT Ch 11, p. 148]]}$$

SECTION D

34. (a) **Postulates:**

- Matter made of tiny particles
- Particles have space between them
- Particles are continuously moving
- Particles attract each other [[NCERT Ch 1, p. 3-4]]

(b) Gas particles move randomly and collide with container walls, exerting force per unit area = pressure.

(c) Heat energy supplied is used to overcome intermolecular forces (latent heat), not to increase kinetic energy/temperature. [[NCERT Ch 1, p. 5]]

35. (a) **Atom:** Smallest particle of element retaining its chemical properties.
- (b) **Rutherford's experiment:**
- Fired α -particles at thin gold foil
 - Most passed through $\rightarrow$ atom mostly empty space
 - Some deflected $\rightarrow$ positive charge concentrated in nucleus
 - Very few rebounded $\rightarrow$ nucleus very small & dense
- [Diagram should show source, gold foil, fluorescent screen with deflection patterns]* [[NCERT Ch 4, p. 41-43]]
- (c) **Limitations:**
- (i) Couldn't explain stability of atom (why electrons don't spiral into nucleus)
 - (ii) Couldn't explain discrete spectral lines [[NCERT Ch 4, p. 44]]
36. (a) **Law of conservation of momentum:**
- Statement:* Total momentum of isolated system remains constant if no external force acts.
- Proof:* Consider two bodies A & B colliding.
- By Newton's third law: $F_{AB} = -F_{BA}$
- $$\Rightarrow m_A a_A = -m_B a_B$$
- $$\Rightarrow m_A \frac{(v_A - u_A)}{t} = -m_B \frac{(v_B - u_B)}{t}$$
- $$\Rightarrow m_A u_A + m_B u_B = m_A v_A + m_B v_B$$
- $\therefore$ Initial momentum = Final momentum [[NCERT Ch 9, p. 124-125]]
- (b) **Given:** $m_g = 5 \text{ kg}$, $m_b = 0.05 \text{ kg}$, $v_b = 200 \text{ m/s}$, $u_g = u_b = 0$
- By conservation of momentum:
- $$m_g u_g + m_b u_b = m_g v_g + m_b v_b$$
- $$0 = 5v_g + (0.05 \times 200)$$
- $$5v_g = -10$$
- $$v_g = -2 \text{ m/s (negative sign indicates opposite direction)} \text{ [[NCERT Ch 9, p. 126]]}$$

SECTION E

37. (a) Homogeneous mixture/solution
- (b) Heterogeneous mixture/suspension
- (c) Sedimentation & decantation OR filtration
- (d) Salt particles are small & interact with water molecules (solubility); sand particles are large & insoluble [[NCERT Ch 2, p. 19-21]]
38. (a) $a = \frac{12-0}{4} = 3 \text{ m/s}^2$
- (b) Distance = Area of rectangle = $12 \times 4 = 48 \text{ m}$
- (c) Uniform retardation/deceleration
- (d) Total distance = Area under graph
- $$= \frac{1}{2} \times 4 \times 12 + 12 \times 4 + \frac{1}{2} \times 4 \times 12$$
- $$= 24 + 48 + 24 = 96 \text{ m} \text{ [[NCERT Ch 8, p. 107-108]]}$$
39. (a) Crossing two genetically different plants to produce offspring with desirable traits
- (b) (i) Improve soil structure (ii) Environmentally friendly/no pollution
- (c) Nitrogen, Phosphorus, Potassium (any two)
- (d) Growing different crops sequentially on same land; helps restore soil nutrients depleted by previous crop [[NCERT Ch 15, p. 208-210]]