

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/application questions.

SECTION A (20 Marks)

(Multiple Choice Questions – 1 mark each)

1. Which state of matter has definite shape and volume?
(a) Solid
(b) Liquid
(c) Gas
(d) Plasma
2. The process of conversion of vapour into liquid is called:
(a) Sublimation
(b) Condensation
(c) Evaporation
(d) Deposition
3. The chemical formula of aluminium oxide is:
(a) AlO
(b) Al₂O
(c) AlO₂
(d) Al₂O₃
4. The number of electrons in a neutral atom equals the number of:
(a) Neutrons
(b) Protons
(c) Nucleons
(d) Photons
5. The maximum number of electrons that can be accommodated in M-shell is:
(a) 2
(b) 8
(c) 18
(d) 32
6. The cell organelle responsible for protein synthesis is:
(a) Mitochondria
(b) Ribosome
(c) Lysosome
(d) Vacuole

7. Which of the following is a complex permanent tissue in plants?
- (a) Parenchyma
 - (b) Collenchyma
 - (c) Xylem
 - (d) Sclerenchyma
8. The phylum to which starfish belongs is:
- (a) Porifera
 - (b) Coelenterata
 - (c) Echinodermata
 - (d) Arthropoda
9. The rate of change of velocity is called:
- (a) Speed
 - (b) Displacement
 - (c) Acceleration
 - (d) Distance
10. If a body travels equal distances in unequal intervals of time, its motion is:
- (a) Uniform
 - (b) Non-uniform
 - (c) Circular
 - (d) Periodic
11. The product of mass and velocity of a body is called:
- (a) Force
 - (b) Momentum
 - (c) Impulse
 - (d) Inertia
12. The value of acceleration due to gravity on the surface of earth is approximately:
- (a) $6.67 \times 10^{-11} \text{ m/s}^2$
 - (b) 9.8 m/s^2
 - (c) 10 N
 - (d) 9.8 N/kg^2
13. The work done by the force of gravity when a body is moved horizontally is:
- (a) Positive
 - (b) Negative
 - (c) Zero
 - (d) Maximum
14. The commercial unit of energy is:
- (a) Joule
 - (b) Watt
 - (c) Kilowatt hour
 - (d) Newton
15. The distance between two consecutive compressions in a sound wave is called:
- (a) Amplitude
 - (b) Frequency
 - (c) Wavelength
 - (d) Time period

16. Sound cannot travel through:
- (a) Solids
 - (b) Liquids
 - (c) Gases
 - (d) Vacuum
17. Which of the following is a non-infectious disease?
- (a) Malaria
 - (b) Diabetes
 - (c) Tuberculosis
 - (d) Typhoid
18. The vector for malaria is:
- (a) Housefly
 - (b) Female Anopheles mosquito
 - (c) Cockroach
 - (d) Rat
19. Which macronutrient is essential for chlorophyll formation in plants?
- (a) Nitrogen
 - (b) Phosphorus
 - (c) Potassium
 - (d) Magnesium
20. The practice of growing two or more crops simultaneously on the same field is called:
- (a) Crop rotation
 - (b) Mixed cropping
 - (c) Intercropping
 - (d) Fallowing

SECTION B (12 Marks)

(Very Short Answer Questions – 2 marks each)

21. Why does the smell of hot sizzling food reach us several metres away but to get the smell from cold food we have to go close? (NCERT Ch 1, p. 2-3)
22. Calculate the mass of 0.5 mole of N_2 gas. (Atomic mass of N = 14 u) (NCERT Ch 3, p. 35)
23. Why is the plasma membrane called selectively permeable membrane? (NCERT Ch 5, p. 53)
24. A body is moving with uniform velocity. What is its acceleration? Give reason. (NCERT Ch 8, p. 100)
25. Define momentum. Write its SI unit. (NCERT Ch 9, p. 119)
26. What is the relationship between wavelength (λ), frequency (ν) and speed of sound (v)? (NCERT Ch 12, p. 163)

SECTION C (21 Marks)

(Short Answer Questions – 3 marks each)

27. Explain why:
- (a) A desert cooler cools better on a hot dry day
 - (b) We are able to sip hot tea faster from a saucer than a cup
 - (c) Water kept in an earthen pot becomes cool during summer (NCERT Ch 1, p. 10)
28. (a) What is a compound?
- (b) Differentiate between element and compound with one example each.
 - (c) Give one example of a heterogeneous mixture. (NCERT Ch 2, p. 15-16)
29. Calculate the number of molecules present in 4.4 g of CO_2 . (Atomic masses: C = 12 u, O = 16 u; Avogadro's number = 6.022×10^{23}) (NCERT Ch 3, p. 38)
30. Draw a labelled diagram of an animal cell. Mention the functions of nucleus and endoplasmic reticulum. (NCERT Ch 5, p. 56-57)
31. Differentiate between monocots and dicots on the basis of:
- (i) Number of cotyledons
 - (ii) Type of root system
 - (iii) Venation in leaves (NCERT Ch 7, p. 93-94)
32. A train starting from rest attains a velocity of 72 km/h in 10 minutes. Assuming uniform acceleration, find:
- (i) Acceleration
 - (ii) Distance travelled
- (Show all steps with proper units) (NCERT Ch 8, p. 110)
33. State the law of conservation of energy. A body of mass 5 kg is dropped from a height of 20 m. Calculate its kinetic energy just before touching the ground. (Take $g = 10 \text{ m/s}^2$) (NCERT Ch 11, p. 152)

SECTION D (15 Marks)

(Long Answer Questions – 5 marks each)

34. (a) What is diffusion?
- (b) Explain with an activity how diffusion occurs faster in gases than in liquids.
 - (c) Why does diffusion occur more rapidly at higher temperatures? (NCERT Ch 1, p. 2-3)
35. (a) Define atomic number and mass number.
- (b) An element has atomic number 17 and mass number 35. Calculate the number of protons, neutrons and electrons in its neutral atom.
 - (c) Draw Bohr's model for this atom showing distribution of electrons in various shells. (NCERT Ch 4, p. 47-49)
36. (a) Define power. Write its SI unit.
- (b) Derive the relation between kinetic energy and momentum.
 - (c) A man of mass 60 kg runs up a flight of 40 steps in 20 seconds. If each step is 20 cm high, calculate his power. (Take $g = 10 \text{ m/s}^2$) (NCERT Ch 11, p. 155-156)

SECTION E (12 Marks)

37. Read the following passage and answer the questions:

Anita prepared a mixture of iron filings and sulphur powder. She divided it into two parts. To the first part, she added carbon disulphide and observed that sulphur dissolved but iron filings did not. To the second part, she heated the mixture strongly and observed a black mass was formed which did not show magnetic properties.

- (a) What type of mixture is iron filings and sulphur powder before heating?
- (b) Why did sulphur dissolve in carbon disulphide but iron did not?
- (c) What is the black mass formed after heating?
- (d) Why did the black mass not show magnetic properties? (NCERT Ch 2, p. 22-23)

38. Study the distance-time graph below and answer:

[Imagine a d-t graph showing: 0-4s: straight line with positive slope; 4-8s: horizontal line; 8-12s: straight line with steeper positive slope]

- (a) What is the nature of motion between 0-4 seconds?
- (b) What is the speed of the body between 0-4 seconds?
- (c) What does the horizontal line between 4-8 seconds indicate?
- (d) Calculate the average speed of the body for the entire journey of 12 seconds. (NCERT Ch 8, p. 104-105)

39. Read the case and answer:

A poultry farm owner wants to improve egg production. He is considering factors like breed selection, nutrition, lighting, and hygiene.

- (a) Name two exotic breeds of poultry commonly used for egg production.
- (b) Why is proper lighting important in poultry farms?
- (c) What is the importance of providing balanced feed to poultry birds?
- (d) How does vaccination help in poultry farming? (NCERT Ch 15, p. 214-215)

 ANSWER KEY - SET 2

SECTION A

- 1. (a) Solid
- 2. (b) Condensation
- 3. (d) Al_2O_3
- 4. (b) Protons
- 5. (c) 18
- 6. (b) Ribosome
- 7. (c) Xylem
- 8. (c) Echinodermata
- 9. (c) Acceleration
- 10. (b) Non-uniform
- 11. (b) Momentum
- 12. (b) 9.8 m/s^2
- 13. (c) Zero (force of gravity acts vertically, displacement horizontal $\rightarrow \theta = 90^\circ$)
- 14. (c) Kilowatt hour

15. (c) Wavelength
16. (d) Vacuum
17. (b) Diabetes
18. (b) Female Anopheles mosquito
19. (d) Magnesium
20. (c) Intercropping

SECTION B

21. **Explanation:** Rate of diffusion increases with temperature. Hot food has higher kinetic energy → particles move faster → diffuse rapidly over larger distances. Cold food particles have lower kinetic energy → diffuse slowly → require closer proximity. [[NCERT Ch 1, p. 2-3]]
22. **Mass of 0.5 mole of N_2 :**
 Molar mass of $N_2 = 2 \times 14 = 28 \text{ g/mol}$
 Mass = Number of moles $\times$ Molar mass = $0.5 \times 28 = 14 \text{ g}$ [[NCERT Ch 3, p. 35]]
23. **Selectively permeable:** Plasma membrane allows only certain substances to enter/exit the cell while preventing others. It controls movement based on size, charge, and solubility of molecules. [[NCERT Ch 5, p. 53]]
24. **Acceleration = 0 m/s^2**
 Reason: Acceleration is rate of change of velocity. Uniform velocity means velocity is constant → no change in velocity → acceleration = 0. [[NCERT Ch 8, p. 100]]
25. **Momentum:** Product of mass and velocity of a body.
 $\vec{p} = m\vec{v}$
 SI unit: kilogram metre per second (kg m/s) [[NCERT Ch 9, p. 119]]
26. **Relationship:** $v = \nu\lambda$
 where ν = speed of sound, ν = frequency, λ = wavelength [[NCERT Ch 12, p. 163]]

SECTION C

27. (a) **Desert cooler:** Works on evaporation principle. On hot dry days, humidity is low → rate of evaporation is high → more cooling effect. [[NCERT Ch 1, p. 10]]
 (b) **Saucer vs cup:** Saucer has larger surface area → increases rate of evaporation → cools tea faster. [[NCERT Ch 1, p. 10]]
 (c) **Earthen pot:** Has tiny pores → water seeps out and evaporates → takes latent heat from remaining water → cools it. [[NCERT Ch 1, p. 10]]
28. (a) **Compound:** Pure substance formed when two or more elements chemically combine in fixed proportion.
 (b) **Element:** Cannot be broken into simpler substances (e.g., Iron). **Compound:** Can be broken into elements (e.g., Water → $H_2 + O_2$).
 (c) Salad, sand-water mixture, etc. [[NCERT Ch 2, p. 15-16]]
29. **Molecular mass of $CO_2 = 12 + (2 \times 16) = 44 \text{ u}$**
 Number of moles in 4.4 g = $\frac{4.4}{44} = 0.1 \text{ mole}$
 Number of molecules = $0.1 \times 6.022 \times 10^{23} = 6.022 \times 10^{22}$ [[NCERT Ch 3, p. 38]]
30. **Animal cell diagram** must show: plasma membrane, nucleus, mitochondria, ER, Golgi, lysosomes, ribosomes.

Nucleus: Controls cellular activities; contains genetic material (DNA).

Endoplasmic reticulum: Rough ER – protein synthesis; Smooth ER – lipid synthesis & detoxification. [[NCERT Ch 5, p. 56-57]]

31.

Feature	Monocots	Dicots
Cotyledons	One	Two
Root system	Fibrous	Taproot
Venation	Parallel	Reticulate

32. **Given:** $u = 0$, $v = 72 \text{ km/h} = 20 \text{ m/s}$, $t = 10 \text{ min} = 600 \text{ s}$

(i) $a = \frac{v-u}{t} = \frac{20-0}{600} = \frac{1}{30} = 0.033 \text{ m/s}^2$

(ii) $s = ut + \frac{1}{2}at^2 = 0 + \frac{1}{2} \times \frac{1}{30} \times (600)^2 = \frac{1}{60} \times 360000 = 6000 \text{ m}$ [[NCERT Ch 8, p. 110]]

33. **Law of conservation of energy:** Energy can neither be created nor destroyed; it can only be transformed from one form to another. Total energy in an isolated system remains constant. [[NCERT Ch 11, p. 152]]

Given: $m = 5 \text{ kg}$, $h = 20 \text{ m}$, $g = 10 \text{ m/s}^2$

Potential energy at top = $mgh = 5 \times 10 \times 20 = 1000 \text{ J}$

By conservation of energy:

PE at top = KE just before touching ground

$\therefore \text{KE} = 1000 \text{ J}$

SECTION D

34. (a) **Diffusion:** Spontaneous intermixing of particles of two substances on their own due to random motion. [[NCERT Ch 1, p. 2]]

(b) **Activity:**

- Take two beakers – one with water, one with air
- Add a drop of ink to water beaker; release incense smoke in air beaker
- Observation: Smoke spreads throughout room quickly; ink spreads slowly in water
- Conclusion: Diffusion faster in gases than liquids

(c) **Reason:** At higher temperatures, particles gain kinetic energy $\rightarrow$ move faster $\rightarrow$ collide more frequently $\rightarrow$ diffusion rate increases. [[NCERT Ch 1, p. 3]]

35. (a) **Atomic number (Z):** Number of protons in nucleus.

Mass number (A): Sum of protons and neutrons in nucleus. [[NCERT Ch 4, p. 47]]

(b) **Given:** $Z = 17$, $A = 35$

Protons = $Z = 17$

Electrons = Protons = 17 (neutral atom)

Neutrons = $A - Z = 35 - 17 = 18$

(c) **Bohr's model for Chlorine (Z=17):**

K-shell ($n=1$): 2 electrons

L-shell ($n=2$): 8 electrons

M-shell ($n=3$): 7 electrons

[Diagram should show nucleus with 17p, 18n; three concentric circles with 2, 8, 7 electrons] [[NCERT Ch 4, p. 48-49]]

36. (a) **Power:** Rate of doing work or rate of energy transfer.

$$P = \frac{W}{t}$$

SI unit: Watt (W) = 1 Joule/second [[NCERT Ch 11, p. 155]]

- (b) **Relation between KE and momentum:**

Kinetic energy, $KE = \frac{1}{2}mv^2$

Momentum, $p = mv \Rightarrow v = \frac{p}{m}$

Substituting: $KE = \frac{1}{2}m \left(\frac{p}{m}\right)^2 = \frac{1}{2}m \cdot \frac{p^2}{m^2} = \frac{p^2}{2m}$

$\therefore KE = \frac{p^2}{2m}$ [[NCERT Ch 11, p. 155]]

- (c) **Given:** $m = 60$ kg, number of steps = 40, height per step = 20 cm = 0.2 m, $t = 20$ s, $g = 10$ m/s²

Total height, $h = 40 \times 0.2 = 8$ m

Work done, $W = mgh = 60 \times 10 \times 8 = 4800$ J

Power, $P = \frac{W}{t} = \frac{4800}{20} = 240$ W [[NCERT Ch 11, p. 156]]

SECTION E

37. (a) Heterogeneous mixture (components retain individual properties)

(b) Sulphur is soluble in carbon disulphide (like dissolves like); iron is insoluble in CS₂

(c) Iron sulphide (FeS) – a compound

(d) Iron sulphide is a compound with different properties from its constituents; it loses magnetic property of iron [[NCERT Ch 2, p. 22-23]]

38. [Assuming graph values: At $t=4$ s, $d=20$ m; at $t=8$ s, $d=20$ m; at $t=12$ s, $d=60$ m]

(a) Uniform motion (straight line with constant slope)

(b) Speed = Slope = $\frac{20-0}{4-0} = 5$ m/s

(c) Body is at rest (no change in distance with time)

(d) Total distance = 60 m, Total time = 12 s

Average speed = $\frac{60}{12} = 5$ m/s [[NCERT Ch 8, p. 104-105]]

39. (a) Leghorn, Rhode Island Red

(b) Proper lighting stimulates endocrine glands → increases egg production; regulates feeding behaviour

(c) Balanced feed provides all essential nutrients (proteins, vitamins, minerals) → ensures healthy growth, high egg production, disease resistance

(d) Vaccination develops immunity against specific diseases (e.g., Ranikhet disease) → reduces mortality → increases productivity [[NCERT Ch 15, p. 214-215]]

NCERT Class IX Science Textbook (2024-25 Edition) - Quick Reference

Chapter	Title	Approx. Starting Page
1	Matter in Our Surroundings	p. 1

Chapter	Title	Approx. Starting Page
2	Is Matter Around Us Pure?	p. 14
3	Atoms and Molecules	p. 26
4	Structure of the Atom	p. 38
5	The Fundamental Unit of Life	p. 54
6	Tissues	p. 69
7	Diversity in Living Organisms	p. 82
8	Motion	p. 97
9	Force and Laws of Motion	p. 113
10	Gravitation	p. 127
11	Work and Energy	p. 143
12	Sound	p. 158
13	Why Do We Fall Ill?	p. 174
15	Improvement in Food Resources	p. 204

Note: Page numbers are approximate and may vary by ± 2 pages depending on print edition.