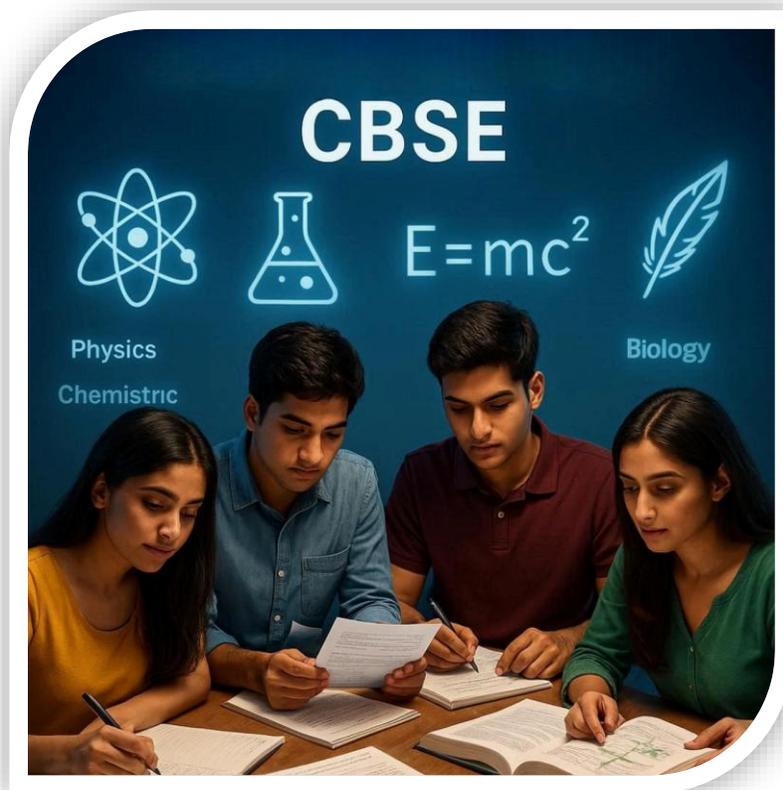


CBSE Class 12 Science Previous Year Question Papers (2016–2025) with Solutions



Complete Practice Guide for Board Exam 2026 | Physics • Chemistry •
Mathematics • Biology • English Core | Latest CBSE Pattern &
Competency-Based Questions

Published By: **SWAN India Publication**

 Dedication

This book is lovingly dedicated to all the **hardworking students** who dare to dream beyond limits and strive each day to turn those dreams into reality.

May your dedication, courage, and consistency light the path to success —
because every step you take today builds the foundation of your tomorrow?

“Success belongs to those who prepare with purpose today, for a brighter tomorrow.”

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Dedicated to Quality, Clarity, and Student Success

Note: Every effort has been made to ensure the accuracy of the content. However, the publisher and author are not responsible for any inadvertent errors or omissions.

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CBSE Exam Pattern 2025 Overview

The **CBSE Class 12 Science Board Exam 2026** will follow the updated **competency-based pattern**, introduced under the **National Education Policy (NEP 2025)**.

This pattern focuses on **concept understanding, application, and analytical reasoning**, rather than rote memorization.

The paper is designed to test **critical thinking, problem-solving ability, and concept clarity** of students.

Below is the approximate **weightage distribution** for different types of questions:

- **Competency-based questions – 50%**

These include **case-based, assertion-reason, and application-oriented** questions. Students must apply concepts to real-life situations or analyze data to answer correctly.

- **Objective / MCQs – 20%**

These are short, direct questions testing conceptual knowledge, definitions, or factual understanding. Each carries **1 mark** and helps in quick scoring if your concepts are clear.

- **Short & Long Answer Questions – 30%**

These questions assess **explanation skills, writing clarity, and depth of understanding**.

Answers should be structured, concise, and as per **CBSE marking scheme** (with key points underlined).

Tip:

Focus more on **competency and case-based questions**, as CBSE's new format aims to test understanding over memorization.

Subjects Covered – Science Stream

This book has been designed especially for **CBSE Class 12 Science students**, covering all the major subjects included in the CBSE curriculum.

Each subject's Previous Year Questions (PYQs) from **2016–2025** have been compiled and solved in a **step-by-step, exam-oriented manner**, following the **latest CBSE 2026 pattern**.

Below are the subjects included in this book 

• **Physics**

Includes **numerical problems, derivations, reasoning, and conceptual questions** from all important chapters such as Electrostatics, Current Electricity, Magnetism, Optics, and Communication Systems.

Each question follows CBSE's **step-marking format**, ensuring concept clarity and accuracy.

• **Chemistry**

Covers **Physical, Organic, and Inorganic Chemistry** questions from the last 10 years.

Detailed explanations of numerical problems, reaction mechanisms, and reasoning-based questions are provided as per the **latest board pattern**.

• **Mathematics**

Includes PYQs from **Algebra, Calculus, Vectors, Probability,**

and Coordinate Geometry.

Solutions are provided in **simple steps**, with formulas and reasoning clearly highlighted to help you learn faster and avoid common mistakes.

• Biology

Covers **diagram-based, reasoning, and application-level** questions from Genetics, Evolution, Biotechnology, and Ecology.

Each answer is written using **NCERT keywords** and labeled diagrams as per **CBSE marking scheme**.

• English Core

Includes solved PYQs from **Reading, Grammar, and Literature (Flamingo & Vistas)** sections.

Answers follow **CBSE format**, with proper structure, key points, and vocabulary enhancement tips.

“Master every subject with clarity and confidence — one question at a time.”

Physics

Time: 3 Hours / Maximum Marks: 70

⚡ **General Instructions:**

1. All questions are compulsory.
 2. Internal choices are provided where applicable.
 3. Use of scientific calculator is allowed.
 4. Draw labeled diagrams wherever necessary.
 5. Show all steps clearly for numerical questions.
-

Section A (1 Mark Each)

(Each question carries 1 mark)

Q1. Define electric flux. Write its SI unit.

Answer:

Electric flux (Φ) is the measure of the number of electric field lines passing normally through a given surface.

SI Unit: $\mathbf{N \cdot m^2 / C}$

Q2. What happens to the capacitance of a parallel plate capacitor when a dielectric slab is inserted?

Answer:

When a dielectric slab is inserted, capacitance **increases by a factor of K** (dielectric constant).

New capacitance, $C' = K \times C$

Q3. State one advantage of alternating current (AC) over direct current (DC).

Answer:

AC can be **easily transmitted over long distances** with low power loss using transformers, while DC cannot be transformed easily.

Q4. What is the effect of increasing slit separation in Young's Double Slit Experiment on fringe width?

Answer:

Fringe width (β) is inversely proportional to slit separation (d). So, if slit separation increases, **fringe width decreases**.

Formula: $\beta = \lambda D/d$

Q5. Write one application of infrared rays.

Answer:

Infrared rays are used in **remote controls, night vision cameras, and medical therapy** for muscle pain relief.

Q6. What is the relationship between the radii of curvature of mirrors in an astronomical telescope?

Answer:

In a reflecting telescope, **focal length of objective > focal length of eyepiece.**

Thus, $R_1 > R_2$ (since $f = R/2$).

Q7. Define modulation in communication systems.

Answer:

Modulation is the process of **superimposing a low-frequency signal (information)** onto a **high-frequency carrier wave** for transmission over long distances.

Section B (2 Marks Each)

Q8. State Gauss's theorem and apply it to determine the electric field due to an infinitely long straight uniformly charged wire.

Answer:

Gauss's Theorem: The total electric flux through a closed surface is equal to $1/\epsilon_0$ times the total charge enclosed by the surface.

Formula: $\Phi = q / \epsilon_0$

For an infinite wire with charge per unit length λ :
Electric field at a distance r is given by:

$$E \times (2\pi rL) = \lambda L / \epsilon_0$$

$$\text{So, } E = \lambda / (2\pi \epsilon_0 r)$$

Q9. A cell of emf 2.5 V and internal resistance 0.5 Ω is connected to a 4 Ω resistor. Find:

(a) Current in the circuit

(b) Terminal voltage of the cell

Answer:

$$\begin{aligned} \text{(a) } I &= E / (R + r) \\ &= 2.5 / (4 + 0.5) \\ &= 0.555 \text{ A} \end{aligned}$$

$$\begin{aligned} \text{(b) } V &= E - I \times r \\ &= 2.5 - 0.555 \times 0.5 \\ &= 2.22 \text{ V} \end{aligned}$$

Q10. Derive the expression for the force experienced by a current-carrying conductor placed in a uniform magnetic field.

Answer:

Force on a current-carrying conductor:

$$\mathbf{F} = \mathbf{B} \times \mathbf{I} \times \mathbf{L} \times \sin\theta$$

where:

B = magnetic field strength,

I = current,

L = length of conductor,

θ = angle between field and conductor.

When $\theta = 90^\circ$, $F = BIL$ (maximum).

Q11. Write any two differences between step-up and step-down transformers.

Answer:

Step-Up Transformer	Step-Down Transformer
Increases voltage	Decreases voltage
Secondary turns > Primary turns	Secondary turns < Primary turns

Section C (3 Marks Each)

Q12. A circular coil of radius 10 cm and 50 turns carries a current of 3 A. Calculate the magnetic field at its center.

Answer:

Formula: $B = \mu_0 \times N \times I / (2R)$

Substitute values:

$$B = (4\pi \times 10^{-7} \times 50 \times 3) / (2 \times 0.1)$$

$$B = 9.42 \times 10^{-4} \text{ T}$$

Q13. State Faraday's laws of electromagnetic induction. Explain how emf is induced when magnetic flux linked with a coil changes.

Answer:

First Law: Whenever magnetic flux linked with a coil changes, an emf is induced.

Second Law: The magnitude of induced emf is directly proportional to the rate of change of magnetic flux.

Formula: $\mathbf{e = - d\Phi / dt}$

The negative sign shows the induced emf opposes the change (Lenz's Law).

Q14. Write the principle of a moving coil galvanometer. Why is a radial magnetic field used in it?

Answer:

Principle: It works on the principle that a current-carrying coil placed in a magnetic field experiences a torque.

Radial magnetic field is used so that **the torque remains proportional to current (uniform rotation)** at all positions of the coil.

Section D (5 Marks Each)

Q15. (a) Explain the working of a transformer with the help of a labeled diagram.

(b) Mention two sources of energy loss in a transformer and suggest methods to minimize them.

Answer:

Working: Based on **mutual induction**, a transformer transfers energy between two coils without direct contact.

Losses:

1. **Eddy Current Loss:** Reduced by laminating iron core.
 2. **Hysteresis Loss:** Reduced by using soft iron.
 3. **Copper Loss:** Reduced by using thick, low-resistance wires.
-

Q16. Using a ray diagram, derive the mirror formula for a concave mirror.

Answer:

Consider object AB, image A'B', mirror M.

Using geometry:

$$1/f = 1/u + 1/v$$

where:

f = focal length,

u = object distance,

v = image distance.

Q17. (a) What are semiconductors? Explain intrinsic and extrinsic types.

(b) With a diagram, explain the working of a p-n junction diode in forward bias condition.

Answer:

(a) Substances whose conductivity lies between conductors and insulators.

- **Intrinsic:** Pure semiconductor (Si or Ge).
- **Extrinsic:** Doped semiconductor to increase conductivity.

(b) **Forward Bias:** p-side connected to positive terminal.
Barrier decreases → current flows.

Section E (Numerical – 5 Marks Each)

Q18. A parallel plate capacitor with air as dielectric has plate area 0.2 m^2 and separation 0.01 m . It is connected to a 200 V supply.

Find:

- Capacitance
- Charge stored
- Energy stored
- Energy after inserting dielectric constant $K = 5$

Answer:

$$\begin{aligned}C &= \epsilon_0 \times A / d \\&= 8.85 \times 10^{-12} \times 0.2 / 0.01 \\&= 1.77 \times 10^{-10} \text{ F}\end{aligned}$$

$$Q = C \times V = 1.77 \times 10^{-10} \times 200 = 3.54 \times 10^{-8} \text{ C}$$

$$U = 0.5 \times C \times V^2 = 0.5 \times 1.77 \times 10^{-10} \times 200^2 = 3.54 \times 10^{-6} \text{ J}$$

With dielectric,

$$C' = K \times C = 5 \times 1.77 \times 10^{-10} = 8.85 \times 10^{-10} \text{ F}$$

$$U' = 0.5 \times C' \times V^2 = 0.5 \times 8.85 \times 10^{-10} \times 200^2 = 1.77 \times 10^{-5} \text{ J}$$

Section F (Case Study – 4 Marks)

Q19. A student constructs an optical fiber communication system to transfer data signals using light.

- (a) Explain the principle of total internal reflection used in optical fibers.
- (b) Write two advantages of optical fiber communication.
- (c) What will happen if the refractive indices of the core and cladding are equal?

Answer:

- (a) When light enters at an angle greater than the critical angle, it undergoes **total internal reflection**, allowing signal transmission.
- (b) Advantages: **High speed, minimum signal loss, noise-free transmission.**
- (c) If refractive indices are equal, **no reflection occurs**, hence signal fails.



Thank You Note

This book has been created with the vision to help every student prepare confidently for their CBSE Class 12 journey. We sincerely thank all the teachers, students, and mentors whose feedback and inspiration made this work possible.

Your support encourages us to continue developing quality educational content for learners across India.

We hope this book becomes your trusted companion in achieving success and clarity.

Keep learning, keep growing — because **every small effort takes you closer to excellence.**

With gratitude,

SWAN India Publication

 *Learn Better. Grow Smarter. Achieve More.*