Lesson Plan: Light – Reflection and Refraction (CBSE Class X 2026-27)

Teacher:

Class: X

Subject: Science (Subject Code - 086)

Unit III: Natural Phenomena (Unit Weightage: 12 Marks)

Chapter: 9 – Light – Reflection and Refraction

Estimated Number of Periods: 14

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1. Gist of the Lesson & Curricular Goals

- **Core Syllabus:** Reflection of light by curved surfaces; Images formed by spherical mirrors (centre of curvature, principal axis, principal focus, focal length), mirror formula (derivation not required), magnification. Refraction; Laws of refraction, refractive index. Refraction by spherical lenses; Image formed by spherical lenses; Lens formula (derivation not required); Magnification; Power of a lens .

- **Educational Aim:** To understand the physical world through scientific principles, developing the capacity to manipulate variables (object position, lens properties) to observe outcomes and represent them accurately using ray diagrams and mathematical formulas.

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2. Teaching-Learning Plan & Pedagogy

Key Concepts	**Competencies (C) & Learning Outcomes**	**Teaching-Learning Activities (Pedagogy)**	**Assessment Strategies**
Reflection & Spherical Mirrors	**C-2.3:** Manipulates the position of an object and properties of lenses/mirrors to observe image characteristics.	• **Mandatory Practical (Exp 10a):** Determination of the focal length of a concave mirror by obtaining the image of a distant object	• **[Demonstrate Knowledge - VSA]:** *Define* the principal focus of a concave mirror. • **[Application - SA]:**

	• *Outcome:* Students will draw ray diagrams for concave/convex mirrors and state the sign convention.	(e.g., a tree or building outside the window) on a screen . • **Visual Mapping:** Step-by-step drafting of standard incident rays (parallel, through focus, through center of curvature) on the board.	*Illustrate* the image formation by a concave mirror when the object is placed between C and F.
Mirror Formula & Magnification	**C-2.3:** Mathematises relationships. • *Outcome:* Students will apply the mirror formula (1/v + 1/u = 1/f) and magnification (m = -v/u) to solve numerical problems.	• **Mathematical Application:** Solve numericals emphasizing Cartesian sign conventions (f is negative for concave, positive for convex). • **Discussion:** Note that derivations of these formulas are strictly excluded from the assessment.	• **[Application - LA]:** *Calculate* the position and size of the image formed by a convex mirror. • **[Analyze & Evaluate - Assertion-Reasoning]: ***Evaluate* why convex mirrors are used as rear-view mirrors in vehicles.
Refraction & Refractive Index	**C-8.2:** Designs and implements a plan for scientific inquiry, accurately uses instruments, and draws inferences. • *Outcome:* Students will verify the laws of	• **Mandatory Practical (Exp 11):** Tracing the path of a ray of light passing through a rectangular glass slab for different angles of incidence. Measure the angle of incidence, angle of refraction, and angle	• **[Demonstrate Knowledge - Objective]:** *State* Snell's Law of refraction. • **[Formulate & Analyze - Case-Based]:** *Interpret* experimental data from a glass slab

	refraction and define absolute refractive index.	of emergence, and interpret the result .	to prove that the emergent ray is parallel to the incident ray.
Spherical Lenses & Power	**C-2.3:** Observes image characteristics and correspondence with a ray diagram. • *Outcome:* Students will draw lens ray diagrams, apply the lens formula (1/v - 1/u = 1/f), and calculate the Power of a lens (P = 1/f).	• **Mandatory Practical (Exp 10b):** Determination of the focal length of a convex lens by obtaining the image of a distant object . • **Demonstration:** Using different convex lenses to focus sunlight on paper to physically demonstrate the concept of focal length and power.	• **[Demonstrate Knowledge - VSA]:** *Define* 1 Dioptre of power of a lens. • **[Application - SA]:** *Calculate* the focal length of a lens with a power of -2.0 D and identify its type.

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3. Assessment Structure & Weightage

Assessments are strictly modeled on the CBSE 2026-27 Theory Question Paper Design (80 marks):

- **Demonstrate Knowledge and Understanding (50%):** Assessed via questions asking students to *state, name, list, identify, define, suggest, describe, outline, and summarize* (e.g., stating laws of refraction, defining pole and optical centre).
- **Application of Knowledge/Concepts (30%):** Assessed via questions asking students to *calculate, illustrate, show, adapt, explain, and distinguish* (e.g., calculating image distance, illustrating ray diagrams).
- **Formulate, Analyze, Evaluate and Create (20%):** Assessed via questions asking students to *interpret, analyze, compare, contrast, examine, evaluate, discuss, and construct* (e.g., analyzing glass slab lateral displacement, comparing mirror vs. lens formulas).

4. Digital Integration & Portfolio Enrichment (Internal Assessment - 20 Marks)

- **Subject Enrichment (Practical Work - 5 Marks):** Evaluated strictly on the execution of Experiment 10 (Focal length of mirror/lens) and Experiment 11 (Glass slab refraction) . Students will be assessed on their precise placement of pins, accurate angle measurements using a protractor, and neatness of ray tracings in their practical records.

- **Digital Integration Strategy:** To reinforce spatial understanding of image formation ahead of Periodic Assessments (5+5 Marks), utilize interactive digital optics simulators (like PhET Geometric Optics via the DIKSHA portal). Students can digitally drag an object across the principal axis and instantly observe how the real/virtual image shifts, grows, or shrinks.
- **Portfolio Task (5 Marks):** Students will *examine* the use of lenses and mirrors in their own homes. They will prepare a brief write-up identifying three specific optical devices (e.g., a stainless steel soup spoon acting as curved mirrors, a magnifying glass, or their own prescription eyeglasses). For the eyeglasses, they must note the prescribed power, calculate the focal length, and state whether the lens is converging or diverging. This will be securely added to their academic portfolio.