Chapter 9: Light – Reflection and Refraction from Class 10 Science:

1. Light and Its Properties

- Light is a form of energy that enables us to see objects.
- It travels in a straight line and exhibits reflection and refraction.
- It behaves as a wave and can travel through a vacuum.

□ 2. Reflection of Light

Reflection is the bouncing back of light from a surface.

Laws of Reflection:

- 1. The angle of incidence = angle of reflection.
- 2. The incident ray, reflected ray, and the normal all lie in the same plane.

Types of Reflection:

- Regular Reflection: From smooth surfaces like mirrors.
- **Diffuse Reflection**: From rough surfaces.

Types of Mirrors:

- Plane Mirror: Forms virtual, erect, and same-sized images.
- Spherical Mirrors:
 - **Concave (converging)**: Can form real or virtual images.
 - **Convex (diverging)**: Always forms virtual, diminished, and erect images.

Important Terms:

- **Pole (P)**: Center of the mirror surface.
- Center of Curvature (C): Center of the sphere of which the mirror is a part.
- **Principal Axis**: Line passing through P and C.
- Focus (F): Point where parallel rays converge/diverge.
- Focal Length (f): Distance between P and F.

Q 3. Image Formation by Spherical Mirrors

- Use ray diagrams to understand image formation.
- Mirror Formula:

 $\frac{1}{f} = \frac{1}{v} + \frac{1}{u}$

where f = focal length, v = image distance, u = object distance.

• Magnification (m):

$$\mathbf{m} = \frac{\mathbf{h}'}{h} = \frac{-\mathbf{v}}{u}$$

where h' = image height, h = object height.

♦ 4. Refraction of Light

Refraction is the bending of light when it passes from one medium to another.

Laws of Refraction:

- 1. Incident ray, refracted ray, and normal lie in the same plane.
- 2. Snell's Law:

$\frac{\sin i}{\sin r} = constant = n$

where n is the refractive index.

• **Refractive Index (n)**:

n=Speed of light in vacuum / Speed of light in medium Light bends **towards the normal** when entering a denser medium and **away** when entering a rarer medium.

Q 5. Lenses

- **Convex Lens (Converging)**: Forms real or virtual images depending on object position.
- Concave Lens (Diverging): Always forms virtual, erect, and diminished images.

Lens Formula:

 $\frac{1}{f} = \frac{1}{v} - \frac{1}{u}$

Power of a Lens (P):

P=100/f (in cm)

Measured in **dioptres** (**D**).

♠ 6. Dispersion and Prisms

- **Dispersion**: Splitting of white light into its component colors.
- **Prism**: A transparent optical element that disperses light.