Board – CBSE	Class – 10th	Topic – Light Reflection Refraction

1. Ray of Light: A line drawn in the direction of propagation of light is called a ray of light.
2. "Beam of Light: A group of rays of light emitted by a source of light is called a beam of light. A light beam is of three types.
   (i) Parallel beam: A group of light rays parallel to each other is a parallel beam of light.
   (ii) Divergent beam: A group of light rays spreading out from a light source is called a divergent light beam.
   (iii) Convergent beam: A group of light rays meeting at a point called a convergent light beam.
3. Reflection of Light: Some surfaces can send the light back in the same medium when light strikes it. This phenomenon of sending the light back in the same medium by a surface is called the reflection of light.
   (i) The incident ray, the reflected ray and the normal at the point of incidence all lie in the same plane.
   (ii) The angle of incidence is always equal to the angle of reflection, $\angle i = \angle r$.
4. Image: When light rays meet or appear to meet after reflection from a mirror, it is called an image.
   (i) Real Image: It is a kind of image formed by the actual intersection of light rays after reflection.
   (ii) Virtual Image: It is a kind of image formed by producing the reflected rays backwards after reflection.
5. Plane Mirror: A plane mirror is a piece of glass whose one side is polished by silver paint, which is covered by a coating of red paint to protect the silver layer.
6. Spherical Mirrors: It is part of a hollow glass sphere whose one surface is polished. There are two types of the spherical mirror.

(i) Concave Mirror: It is a spherical mirror whose outer surface is polished. The inner or concave side is the reflecting surface.

(ii) Convex Mirror: It is a spherical mirror whose inner is polished. The outer side or convex side is the reflecting surface.

7. Principal Focus :

A point on the principal axis of a spherical mirror where the rays of light parallel to the principal axis meet or appear to meet after reflection from the mirror.

8. Focal Length:

The distance between the pole (P) and principal focus(F) of a spherical mirror is called the mirror's focal length. It is denoted by f.

9. Uses of Concave Mirror :

(i) It is used as a shaving mirror because it forms a large image when it is placed close to the face.

(ii) It is used in solar heating devices like solar cookers because it converges Sun's rays over a small area to produce high temperatures.

(iii) It is used for security checking purposes.

10. Uses of Convex Mirror :

(i) It is used as a rear view mirror in automobiles because it gives an erect image and diminishes due to which Pt. has a wider field of view.

(ii) It is also used in street lights.

11. Mirror Formula:

It is a relation between the distance of the object, a distance of the image from the pole of the mirror and its focal length, i.e., the relation between $'u'$, $'v$ and it is given by $\frac{1}{f} = \frac{1}{u} + \frac{1}{v}$

12. Magnification:

It is defined as the ratio of the height of the image to the height of the object. It is denoted by letter m

$$m = \frac{height\ of\ the\ image\ (I)}{Height\ of\ object\ (O)} = -\frac{v}{u}$$

13. Refraction of Light: The bending of a ray of light when it passes from one medium to another is called refraction.

Laws of Refraction:

(i) The incident ray, the refracted ray and the normal at the point of incidence all lie in the same plane.

(ii) When a ray of light undergoes refraction, the ratio of the sine of the angle of incidence to the sine of the angle of refraction is constant.

14. " The Refractive Index: The refractive index of medium 2 with respect to medium is given by the ratio of the speed of light in medium 1 and the speed of light in medium 2. The symbol usually represents this n_{21}. This can be expressed in an equation form as

$$n_{21} = \frac{n_2}{n_1} = \frac{Speed\ of\ light\ in\ medium\ 1}{Speed\ of\ light\ in\ medium\ 2} = \frac{v_1}{v_2}$$

15. Refraction by spherical lenses: Lens is a transparent medium formed by joining two pieces of spherical glass. There are two types of lenses.

(i) Convex Lens: It is a thicker lens at the centre and thinner at the edges.

(ii) Concave Lens: It is a thinner lens at the centre and thicker at the edges.

16. Terms related to a lens

- Optical Centre of Lens: It is the centre of the lens through which light can pass without any deviation.
- Principal Axis is the line passing through the optical centre and perpendicular to the line joining its edges.
- Principal Focus: It is a point on the principal axis where all light rays parallel to the principal axis either converge or appear to diverge from after refraction.

17. Lens formula:

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

18. Magnification:

Magnification, $m = \frac{h_2}{h_1}$

h_2 : height of the image

h_1 : height of the object

The ratio of the height of the image to the height of the object.

It is also given by $\frac{v}{u}$ i.e., the ratio of the distance of the image to the distance of the object.

$\therefore \frac{h_2}{h_1} = \frac{v}{u}$

19. Power of a lens:

A beam of light parallel to the principal axis either gets converged or diverged after refraction by a lens. Some lenses converge the beam of light to a small extent, and some converge it to a large extent. This ability of a lens to converge or diverge a beam of light is known as the power of the lens.

SI unit of power of lens is dioptre: One dioptre is the power of a lens whose focal length is 1 m.

Power of a combination of two or more lenses:

Suppose two or more lenses are placed together to form a combined lens. In that case, the power of this combined lens is equal to the sum of the powers of individual lenses.

$P = P_1 + P_2 + P_3 + \ldots\ldots \; 1/F = 1/F_1 + 1/F_2 + 1/F_3 + \ldots\ldots$