

## Ch-9 Light – Reflection and Refraction

1. Light is a form of energy that produces in us the sensation of sight.
2. **Reflection of light** – is the phenomenon of bouncing back of light in the same medium on striking the surface of any object.
3. The two laws of reflection are –
  - a. the incident ray, the reflected ray and the normal (at the point of incidence), all lie in the same plane.
  - b. the angle of reflection (r) is always equal to the angle of incidence (i) :  $\angle r = \angle i$ .
4. In a plane mirror, the image of a real object is always –
  - a. virtual,
  - b. erect,
  - c. same size as the object,
  - d. as far behind the mirror as the object is in front of the mirror, and
  - e. laterally inverted.
5. New Cartesian Sign Convention for spherical mirror –
  - a. All distances are measured from the pole of the spherical mirror.
  - b. The distances measured in the direction of incidence of light are taken as positive and vice-versa.
  - c. The heights above the principal axis of the mirror are taken as positive and vice-versa.
6. In spherical mirrors, focal length  $f = \frac{\text{Radius of curvature (R)}}{2}$ .
7. Mirror formula :  $\frac{1}{v} + \frac{1}{u} = \frac{1}{f}$ .
8. Linear magnification produced by a spherical mirror is  $m = \frac{-v}{u} = \frac{\text{size of image (h}_2\text{)}}{\text{size of object (h}_1\text{)}}$ .
9. For a convex mirror, m is +ve and less than one, as the image formed is virtual, erect and shorter than the object.
10. For a concave mirror, m is +ve when image formed is virtual and m is –ve, when image formed is real.
11. New Cartesian Sign Convention for spherical lenses –
  - a. All distances are measured from optical centre C of the lens.
  - b. The distances measured in the direction of incidence of light are taken as positive and vice-versa.
  - c. All heights above the principal axis of the lens are taken as positive and vice versa.
12. Lens formula :  $\frac{1}{v} - \frac{1}{u} = \frac{1}{f}$ .
13. The linear magnification produced by a lens is  $m = \frac{h'}{h} = \frac{v}{u}$ .
14. Power of the combination of lenses  $P = p_1 + p_2 + p_3 \dots$
15. Absolute refractive index(n) of a medium is the ratio of speed of light in vacuum or air(c) to the speed of light in the medium(v) i.e.,  $n = \frac{c}{v}$ .
16. Refraction of light is the phenomenon of change in the path of light in going from one medium to another.
17. In going from a rarer to a denser medium, the ray of light bends towards normal and in going from a denser to a rarer medium, the ray of light bends away from normal.

18. Snell's law of refraction :  $\frac{\sin i}{\sin r} = \frac{n_2}{n_1} = n_{21}$ .

19. No refraction occurs, when –

- a. light is incident normally on a boundary, and
- b. refractive indices of the two media in contact are equal.

$$n_{21} = \frac{n_2}{n_1} = \frac{v_1}{v_2}.$$