

# DAYAWATI MODI ACADEMY

## MODIPURAM MEERUT

Class X

### ASSIGNMENT AND NOTES - PHYSICS

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## NOTES



Light is a form of energy that produces in us the sensation of sight.

- **Reflection of light** is the phenomenon of bouncing back of light in the same medium on striking the surface of any object.
- The two laws of reflection are:
  - (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 reflection ( $r$ ) is always equal to the angle of incidence ( $i$ )  
$$\angle r = \angle i$$
- In a plane mirror, the image of a real object is always
  - (i) virtual,
  - (ii) erect
  - (iii) of same size as the object,
  - (iv) as far behind the mirror as the object is in front of the mirror.
  - (v) laterally inverted.
- 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.

$$n = \frac{c}{v}$$

- Refraction of light is the phenomenon of change in the path of light in going from one medium to another.
- 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.
- Snell's law of refraction,

$$\frac{\sin i}{\sin r} = \frac{n_2}{n_1} = {}^1n_2$$

- No refraction occurs, when
  - (i) light is incident normally on a boundary,
  - (ii) refractive indices of the two media in contact are equal.

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

- Lens formula :  $\frac{1}{v} - \frac{1}{u} = \frac{1}{f}$

- New Cartesian Sign Convention for spherical lenses:

(i) All distances are measured from optical centre C of the lens.

(ii) The distances measured in the direction of incidence of light are taken as positive and vice-versa.

(iii) All heights above the principal axis of the lens are taken as positive and vice versa.

- The linear magnification produced by a lens is

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

- Power of the combination of lenses

$$P = p_1 + p_2 + p_3 \dots$$

- Mirror formula:  $\frac{1}{v} + \frac{1}{u} = \frac{1}{f}$

- Linear magnification produced by a spherical mirror is

$$m = \frac{-v}{u} = \frac{\text{size of image } (h_2)}{\text{size of object } (h_1)}$$

- For a convex mirror,  $m$  is +ve and less than one, as the image formed is virtual, erect and shorter than the object.

- For a concave mirror,  $m$  is +ve when image formed is virtual and  $m$  is -ve, when image formed is real.

- According to New Cartesian Sign Convention, for spherical mirror.

(i) All distances are measured from the pole of the spherical mirror.

(ii) The distances measured in the direction of incidence of light are taken as positive and vice-versa.

(iii) The heights above the principal axis of the mirror are taken as positive and vice-versa.

- In spherical mirror, focal length  $(f) = \frac{\text{Radius of curvature } (R)}{2}$ .

## ASSIGNMENT

1. List four characteristics of the images formed by plane mirrors. (CBSE 2015)
2. Draw a ray diagram to show the path of the reflected ray corresponding to an incident ray which is directed parallel to the principal axis of a convex mirror. Mark on it the angle of incident and the angle of reflection (CBSE 2014)
3. A spherical mirror produces an image of magnification  $-1$  on a screen placed at a distance of 50 cm from the mirror.
  - (a) Write the type of mirror.
  - (b) Find the distance of the image from the object.
  - (c) What is the focal length of the mirror?
  - (d) Draw the ray diagram to show the image formation in this case. (CBSE 2014)
4. State the laws of refraction of light. If the speed of light in vacuum is  $3 \times 10^8 \text{ ms}^{-1}$ , find the speed of light in a medium of absolute refractive index 1.5. (CBSE 2014)
5. Which phenomenon is responsible for making the path of light visible? (CBSE 2012)
6. When we place a glass prism in the path of a narrow beam of white light a spectrum is obtained.
7. What happens when a second identical prism is placed in an inverted position with respect to the first prism? Draw a labeled ray diagram to illustrate it. (CBSE 2012)
8. The power of the lens is  $-4.0\text{D}$ . What is the nature of this lens? (CBSE 2008)
9. Which type of mirror is used to give erect and enlarged image of an object? (CBSE 2008)
10. Draw the ray diagram and also state the position, the relative size and the nature of image formed by a concave mirror when the object is placed at the centre of curvature of the mirror. (CBSE 2011)

