EVERWIN PUBLIC SCHOOL

STD: X PHYSICS NOL

CHAPTER – 10 LIGHT

Introduction:

Light is an electromagnetic radiation and can travel through vacuum. The Medium through which light passes is called an optical medium.

Real Image	Virtual Image
1. It can be formed on a screen	It cannot be obtained on a screen
2. The image is always inverted	Image is always erect
3. The reflected or refracted rays converge at a point producing a real image	The reflected rays or the refracted rays appears to diverge from a point, producing a virtual image

Laws of reflection:

- The angle of incidence is equal to the angle of reflection, $\angle i = \angle r$
- The incident ray, the reflected ray and the normal at the point of incidence, all lie in the same plane.

Image formed by a plane mirror;

- Same size as that of the object.
- At same distance behind the mirrors as the object is in front of the mirror.
- Erect but laterally inverted.
- Virtual.

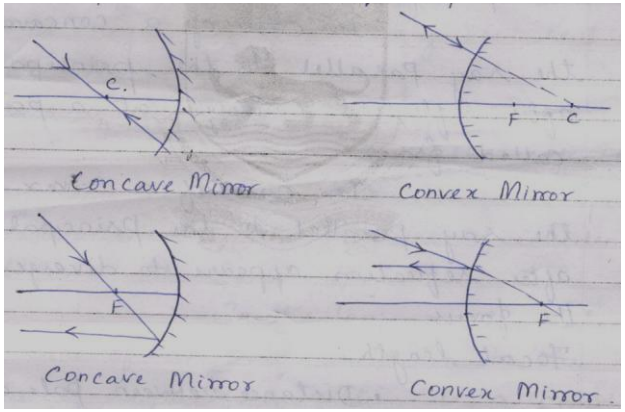
Uses of Plane Mirror: Used as looking glasses. Since a combination of mirrors can produce multiple dimensions in show rooms. They are also used as reflectors in solar cookers.

Rulers for the construction of ray diagrams formed in spherical mirrors:

In case of a concave mirror, incident rays parallel to the principal axis on reflection pass through the principal. focus, whereas in a convex mirror, the reflected rays only appear to pass through the principal focus, when produced backward.

An incident ray passing through the centre of curvature gets reflected along the same path in case of a concave mirror.

In case of a concave mirror an incident ray passing through the principal focus reflects parallel to the principal axis. In case of convex mirror, an incident ray which appears o pass through the focus reflects parallel to the principal axis.



Converging Mirrors Concave mirror; Diverging Mirror Convex Mirror.

Pole: It is the geometric centre of the reflecting surface (P).

Centre of Curvature: it is the centre of the sphere of which the mirror forms a part (C).

Principal Axis: It is straight line passing through the centre of curvature and the pole.

Radius of Curvature: (R): It is the radius of the sphere of which the mirror forms a part.

Principal focus: (F): In case of a concave mirror, the ray parallel to the principal axis after reflection converges at a point called focus. In case of a convex mirror the ray parallel to the principal axis after reflection appears to diverge from the focus.

Focal length: Distance between pole and the focus.

$$f = \frac{R}{2}$$

Mirror Formula: $\frac{1}{f} = \frac{1}{V} + \frac{1}{u}$

f= focal length

u= object distance

v= Image distance

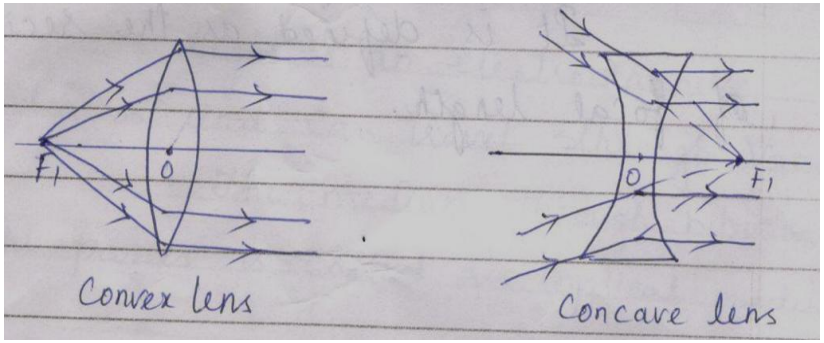
Magnification: (Mirror) m= $\frac{height\ of\ the\ image\ (hi)}{height\ of\ the\ object\ (ho)}$ = m = $-\frac{-v}{u}$

Magnification is positive if the image is erect (and virtual) and it is negative, if the image is real and inverted.

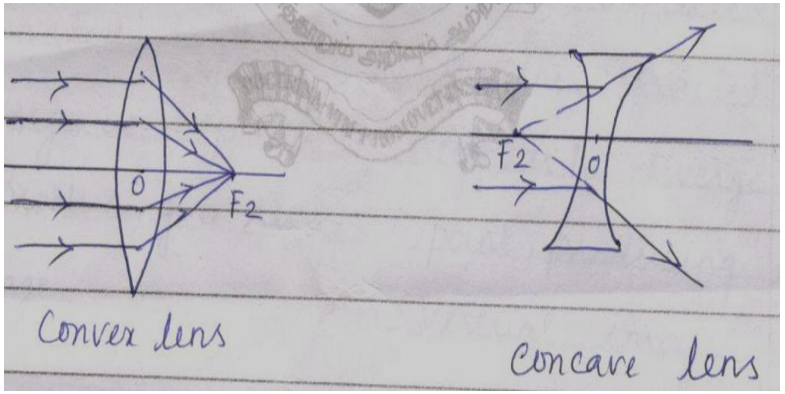
Laws of refraction: Incident ray, the refracted ray and the normal to the surface separating the two media at the point of incidence, all lie on the same plane.
Snell's law – the ratio of angle of incidence to the since of angle of refraction is a constant. $\mu = \frac{\sin i}{\sin r}$

μ - Refractive index

Rarer medium: The medium of lower refractive is called rarer medium .
Denser Medium: The medium of higher refractive index is called denser medium.
Converging lens – convex lens
Diverging lens – concave lens
Optical centre: the centre of a lens.
Centres of curvature: The centers of the two imaginary sphere of which the lens is a part are called centres of curvature.
Radii of curvature: The radii of two imaginary spheres of which the lens is a part are called radii of curvature.
Princuipal axis: The imaginary line joining the two centres of curvature.
Principal focus: First principal focus: It is a point on the principal axis of lens, the rays starting from or directed to which become parallel to principal axis after refraction.



Second principal focus: It is the point on the principal axis at which rays coming parallel to the principal axis, converge on the other side of lens (convex) or appear to meet on the same side of lens (concave) after refraction from the lens.



Lens formula: $\frac{1}{f} = \frac{1}{V} + \frac{1}{u}$

m = $\frac{hi}{ho}$ or m = $\frac{v}{u}$

Power of lens: P= $\frac{1}{f(in\ m)}$ It is defined as the reciprocal pf focal length.