SSLC 2022

PHYSICS IMPORTANT CONCEPTS

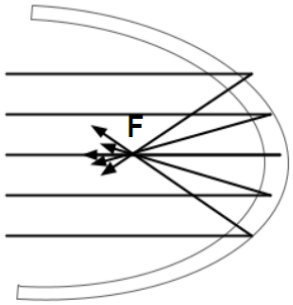
LIGHT- REFLECTION & REFRACTION

REFLECTION:
When light falls on a highly polished surface like a mirror most of the light is sent back into the same medium. This process is called reflection of light.

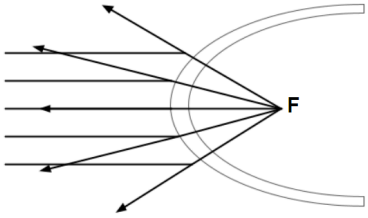
LAWS OF REFLECTION OF LIGHT:
(i)The angle of incidence is equal to the angle of reflection.
ii) The incident ray, the reflected ray and the normal to the mirror at the point of incidence all lie in the same plane.

IMAGE FORMATION IN PLANE MIRROR:
i) The image is erect.
ii) The image is same size as the object.
iii) The image is at the same distance from the mirror as the object is in front of it.
iv) The image is virtual (cannot be obtained on a screen).

CONCAVE MIRROR: is a spherical mirror whose reflecting surface is curved inwards. Rays of light parallel to the principal axis after reflection from a concave mirror meet at a point (converge) on the principal axis.



CONVEX MIRROR: is a spherical mirror whose reflecting surface is curved inwards. Rays of light parallel to the principal axis after reflection from a convex mirror get diverged and appear to come from a point behind the mirror.



Relation between radius of curvature and focal length
R=2f

USES OF MIRRIORS:

Concave mirrors are used

(I) in torches, search lights and head lights of vehicles to get parallel beams of light.
(II) They are used as shaving mirrors to see larger image of the face.
(III) They are used by dentists to see larger images of the teeth.
(IV) Large concave mirrors are used to concentrate sunlight to produce heat in solar furnaces.

Convex mirrors :-

Convex mirrors are used as rear-view mirrors in vehicles. Convex mirrors give erect diminished images of objects. They also have a wider field of view than plane mirrors.

MIRROR FORMULA:

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

MAGNIFICATION: $m = \frac{h(i)}{h(o)}$ **and** $m = -\frac{v}{u}$

Magnification is +ve- virtual image, -ve- real image.

REFRACTION:

When light travels from one transparent medium into another it gets bent. This bending of light is called refraction of light.

When light travels from a rarer medium to a denser medium, it bends towards the normal.

When light travels from a denser medium to a rarer medium to a rarer medium, it bends away from the normal.

LAWS OF REFRACTION OF LIGHT:

i) The incident ray, the refracted ray and the normal to the interface of two transparent media at the point of incidence, all lie in the same plane.

ii) The ratio of the sine of angle of incidence to the sine of angle of refraction is a constant, for the light of a given colour and for the given pair of media.(This law is also known as Snell`s law of refraction)

$$\frac{\sin i}{\sin r} = \mathbf{C(constant)}$$

REFRACTIVE INDEX:

The absolute refractive index of a medium is the ratio of the speed light in air or vacuum to the speed of light in medium.

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

n = index of refraction
c = speed of light in a vacuum
v = speed of light in medium

Material medium	Refractive index	Material medium	Refractive index
Air	1.0003	Canada Balsam	1.53
Ice	1.31		
Water	1.33	Rock salt	1.54
Alcohol	1.36		
Kerosene	1.44	Carbon disulphide	1.63
Fused quartz	1.46	Dense flint glass	1.65
Turpentine oil	1.47	Ruby	1.71
Benzene	1.50	Sapphire	1.77
Crown glass	1.52	Diamond	2.42

Refractive index is inversely proportional to speed of light
Refractive index is directly proportional to denser and rarer medium.

LENS FORMULA :

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

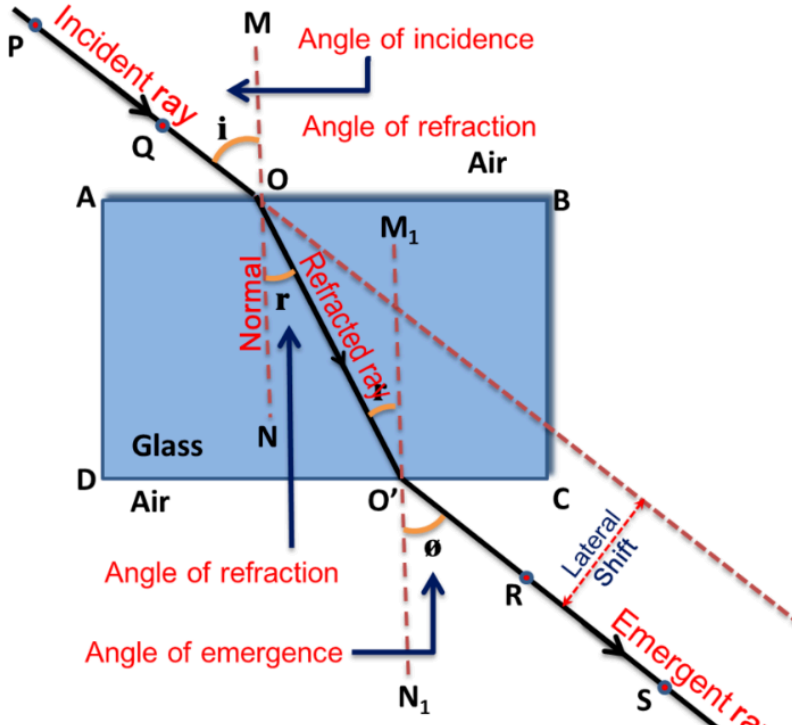
MAGNIFICATION:

$$m = \frac{h(i)}{h(o)} \quad \textbf{and } m = \frac{v}{u}$$

POWER OF LENS:

The power of a lens is the reciprocal of its focal length (in metres). $P = \frac{1}{f}$

The SI unit of power is dioptre (D).
1 dioptre is the power of a lens whose focal length is 1 metre.
The power of a convex lens is positive (+ ve) and the power of a concave lens is negative(- ve).
(REFRACTION THROUGH GLASS SLAB AND RAY DIAGRAMS)


P
Incident ray
M
Angle of incidence
Q
i
Angle of refraction
Air
A
O
B
M1
Normal
r
Refracted ray
Glass
N
D
Air
O'
C
Angle of refraction
ø
Lateral Shift
R
Angle of emergence
Emergent ray
N1
S