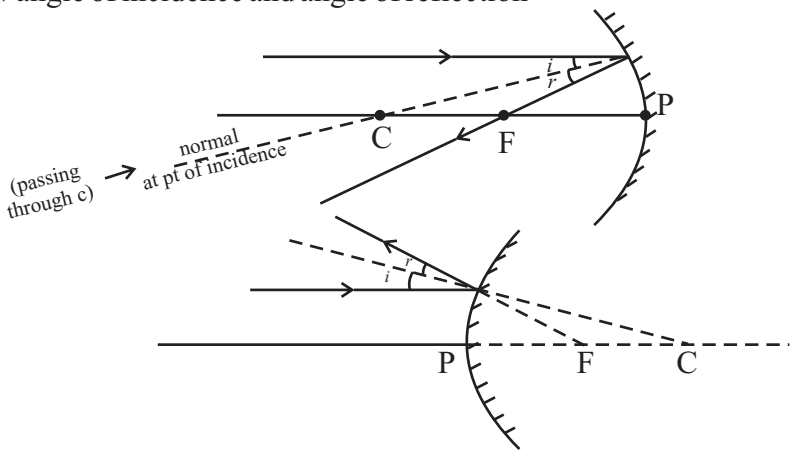
Note : A ray of light passes through centre of cus-valerie reflecting spherical surface is always act as normal at the point of incidence. If we know the normal we can draw angle of incidence and angle of reflection



Note : The image will only form when two or more rays meets at apoint. Image formation by a concave mirror for different position of the object

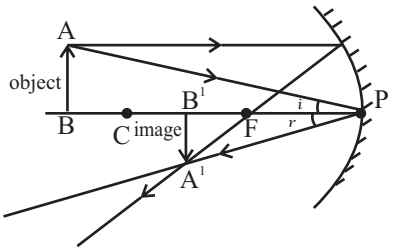
1. Object
At infinity

Position of Image
At focus

Size of Image
Highly diminished (point size)

Nature
Real and Inverted

2. Object
Beyond C

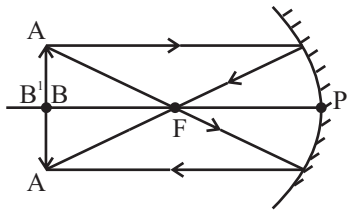


Position of Image
Between F&C

Size of Image
Small

Nature
Real and Inverted

3. Object
At C



Position of Image
At C

Size of Image
Same Size of object

Nature
Real and Inverted

When a incident ray of light AO passes from a rarer medium (air) to a denser medium (glass) at point. O on interface AB, it will bends towards the normal. At pt O^1, on interface DC the light ray entered from denser medium (glass) to rarer medium (air) here the light ray will bend away from normal $OO^1$is a refracted ray OB is an emergent ray. If the incident ray is extended to C, we will observe that emergent ray O^1B is parallel to incident ray. The ray will slightly displaced laterally after refraction.

Note : When a ray of light is incident normally to the interface of two media it will go straight, without any deviation.

Laws of refraction of light-

1. 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.
2. The ratio of sine of angle of incidence to the sine of angle of refraction is a constant ie.

$$\frac{\text{Sin } i}{\text{Sin } r} = \text{constant } (r)$$

for given colour and pair of media, this law is also known as Snells Law

Constant n is the refractive index for a given pair of medium. It is the refractive index of the second medium with respect to first medium.

$$\frac{\text{Sin } i}{\text{Sin } r} = \frac{n_2}{n_1} = n_{21}$$

Where 2 is for second medium and 1 is for first medium

Refractive Index

The refractive index of glass with respect is air is given by ratio of speed of light in air to the speed of light in glass.

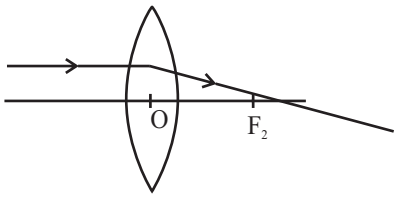
$$n_{ga} = \frac{n_g}{n_a} = \frac{\text{Speed of light in air}}{\text{Speed of light in glass}} = \frac{c}{v}$$

C Speed of light in vacuum = 3 10^8 m/s
speed of light in air is marginally less, compared to that in vacuum.

Refractive index of air with respect to glass is given by

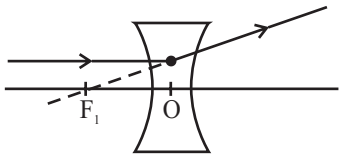
$$\begin{pmatrix} a & air \\ g & glass \end{pmatrix} n_{ag} = \frac{n_a}{n_g} = \frac{\text{Speed of light in glass}}{\text{Speed of light in air}} = \frac{v}{c}$$

Power convex lens or converging lens is always positive



$\because$ f is +ve

Power of concave lens or diverging lens is always negative



$\because$ f is –ve

If any optical instrument have many lens, then **net power** will be

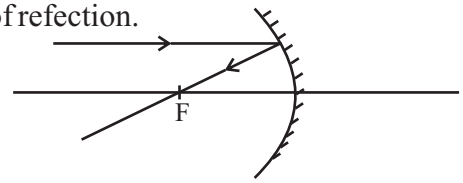
$$P = P_1 + P_2 + P_3....$$

EXERCISE

(Question Bank)

Very Short Answers Type Questions (1 Mark)

1. If the angle of incidence is 0°, what is the angle of reflection?
2. What is the nature of image formed by concave mirror if the magnification produced by the mirror is +3?
3. Give two uses of concave mirror?
4. Find the focal length of a convex mirror, whose radius of curvature is 30 cm?
5. What do you understand by magnification of a spherical mirror?
6. An object is held at the principal focus of a concave lens of focal length f. Where the image will form?
7. Show the angle of incidence and angle of refection.



8. Complete the ray diagram.