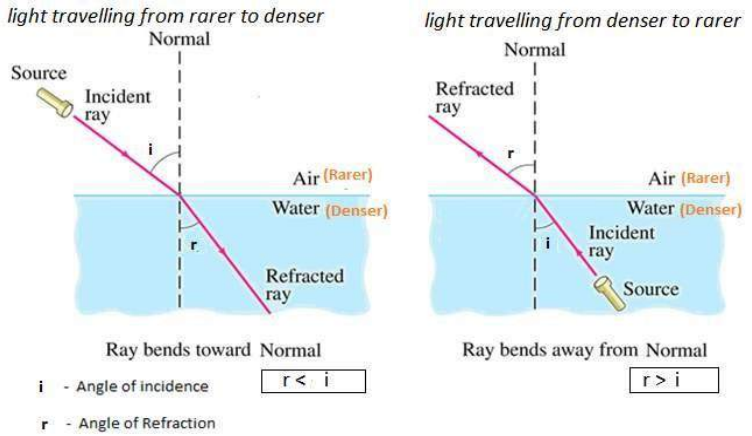
Refraction of Light

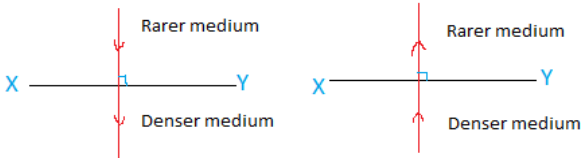
Concept of Refraction :



i - Angle of incidence

r - Angle of Refraction

When i = 0 , r = 0 i.e., no refraction



The Laws of Refraction

- The incident ray, the normal and the refracted ray, all lie on the same plane
- For a given pair of media, the ratio of the sine angle of incidence to the sine of angle of refraction is a constant

$$\mu = \frac{\sin i}{\sin r}$$

μ= refractive Index

i = angle of incident

r = angle of refraction

The second law is also known as *Snell's law*

Terms :

1. Incident Ray : ray which falls on boundary of separation to enter into the other medium
2. Refracted ray: ray in the second medium after deviation
3. Normal: a perpendicular passing through the point at the boundary of separation where the incident ray falls
4. Angle of incidence: angle between incident ray and normal
5. Angle of refraction: angle between refracted ray and normal.

Effects of Refraction :

1. When a stick dipped partially in water , it appears to be bent and short

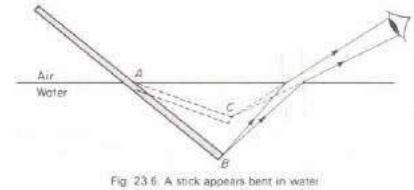
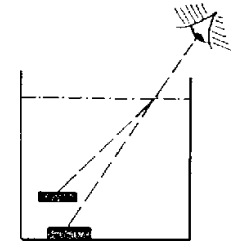
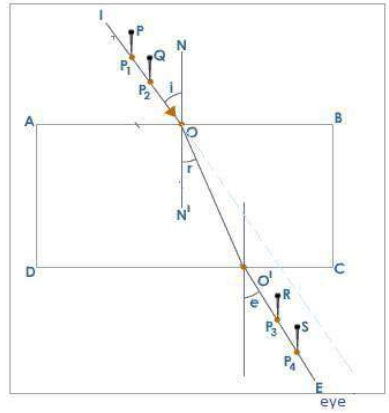


Fig. 23.6 A stick appears bent in water

2. A coin kept in a vessel filled with water appears to be raised.



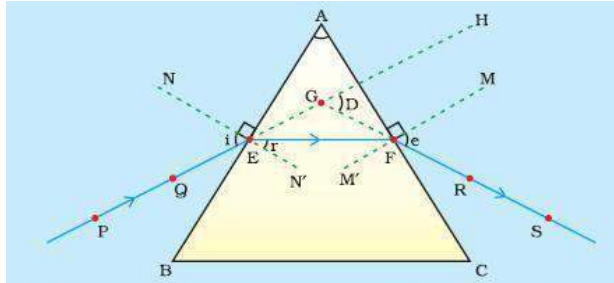
Refraction through glass block :



Angle of incidence = Angle of Emergence

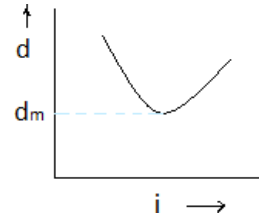
Emergent ray is parallel to the incident ray

Refraction through Prism:



PE – Incident ray
EF – Refracted ray
FS – Emergent ray
∠A – Angle of the prism

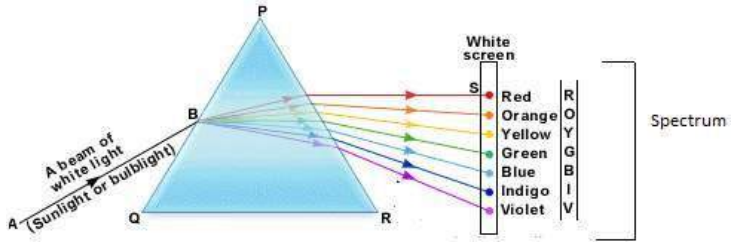
∠i – Angle of incidence
∠r – Angle of refraction
∠e – Angle of emergence
∠D – Angle of deviation



Angle of minimum deviation depends upon:

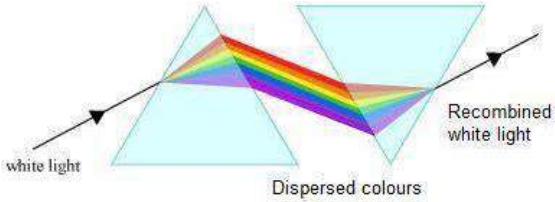
1. Angle of prism
2. Material of prism
3. Angle of incidence
4. Wavelength of light used

Dispersion of light through a prism :

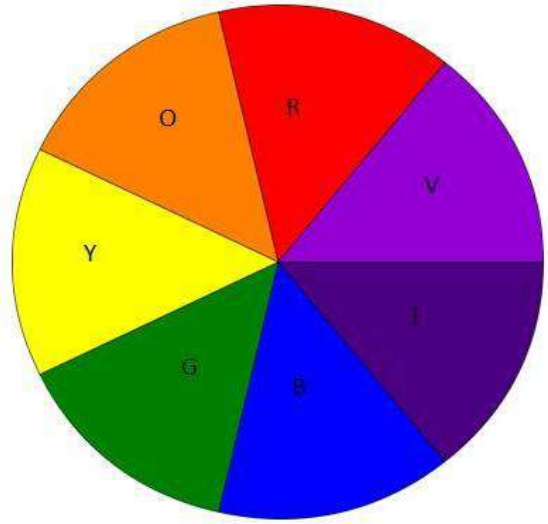


Example of dispersion of white light : Rainbow

Recombination of colours:



Newton's colour disc: - Proof that white light consists of seven colours.



The disc appears white when rotated at a high speed.