## Optics

**Optics is the stream** that deals with the behaviour and properties of light.

## Reflection

It is a phenomenon of change in the path of light without any change in medium.

## Laws of Reflection

1. The angle the incident ray makes with normal is equal to the angle that the reflected ray makes with normal.
2. Incident ray, reflected ray and normal all lie in the same plane.

## Types of mirrors

1. Concave mirror
   The reflecting surface is towards centre of sphere while outer surface is polished.

   **Applications**:
   a. These mirrors are used in opthalmoscope, which reflects light from retina of the eye of the patient.
   b. These are used in search lights
   c. These are used in mirrors that are used in saloons.
2. Convex mirror
   The reflecting surface is away from the centre of the sphere.

   **Applications**
   a. Driver's mirror uses this type of mirror. But the exact distance of the vehicles are not known.
   b. Used in safety viewers at dangerous corners.

## Refraction

It is the phenomenon of bending of light when it moves from one medium to another. There are two scenarios possible here.

a. When the light passes from optically rarer medium to optically denser medium, the light bends towards the normal.
b. When the light passes from optically denser medium to optically rarer medium, it bends away from the normal.

## Laws of Refraction

1. Incident ray, Refracted ray and the normal all are in the same plane.
2. Sin(i)/Sin(r) is constant for 2 given media and this constant is called Refractive Index of second medium w.r.t the first medium.

**Effect of Refraction**

1. Ponds appear shallower
2. Bending of stick in water
3. Apparent shortening of height of person standing in water.
4. Twinkling of stars in sky.

**Critical Angle**

It is the angle of incidence in denser medium for which the angle of refraction in rarer medium is 90deg.

**Total Internal Reflection**

This is a special case of refraction, where light from denser medium travelling to rarer medium is incident at an angle greater than critical angle such that the angle of refraction in rarer medium is 90deg.

**Conditions for TIR to occur**

1. Denser to Rarer medium.
2. Angle of incidence greater than critical angle.