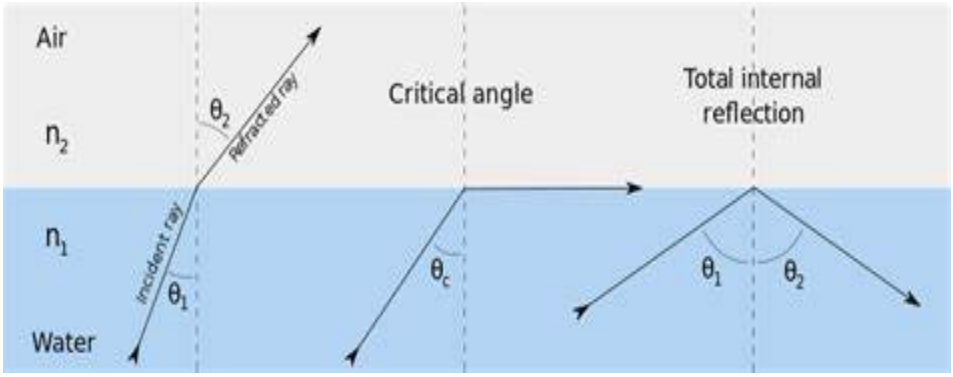
Total Internal Reflection

The phenomenon which occurs when the light rays travel from a more optically denser medium to a less optically denser medium.



Consider the following situation:

- A ray of light passes from a medium of water to that of air. Light ray will be refracted at the junction separating the two media.
- Since it passes from a medium of a higher refractive index to that having a lower refractive index, the refracted light ray bends away from the normal.
- At a specific angle of incidence, the incident ray of light is refracted in such a way that it passes along the surface of the water. This particular angle of incidence is called the critical angle. Here the angle of refraction is 90 degrees.
- When the angle of incidence is greater than the critical angle, the incident ray is reflected back to the medium. We call this phenomenon total internal reflection.

Total Internal Reflection

Formula of Total Internal Reflection

Total internal reflection	n1/n2 = sin r/ sin i
Critical angle, θ	sin θ = n1/n2

Notations Used in the Total Internal Reflection Formula and Critical Angle

- r is the angle of refraction
- i is the angle of incidence
- n1 is the refractive index in medium 1
- n2 is the refractive index in medium 2
- θ is the critical angle
- Notations Used In The Total Internal Reflection Formula And Critical Angle

Conditions of Total Internal Reflection

Following are the two conditions of total internal reflection:

- The light ray moves from a more dense medium to a less dense medium.
- The angle of incidence must be greater than the critical angle.

Examples of Total Internal Reflection

Following are the examples of total internal reflection:

Diamond: When the incident ray falls on every face of the diamond such that the angle formed, the ray is greater than the critical angle. The critical value of the diamond is 23°. This condition is responsible for the total internal reflection in a diamond which makes it shine.

Total Internal Reflection

Mirage: It is an optical illusion that is responsible for the appearance of the water layer at short distances in a desert or on the road. Mirage is an example of total internal reflection which occurs due to atmospheric refraction.