



Al-Mustaqbal University

Department of Optics Techniques

Medical and optical physics 1

First stage

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➤ Lecture 2

Reflection

- **Introduction:** - Light reflection is a fascinating phenomenon that plays a pivotal role in our visual perception of the world. When light encounters a surface, it undergoes a process of reflection, bouncing off the material and changing direction. This fundamental interaction between light and matter is responsible for the shimmering brilliance of a mirror, the gleam of a calm lake, and the sparkle in a diamond. Understanding the principles of light reflection has not only contributed to the development of optics and photography but also has practical applications in everyday life, from the design of reflective surfaces in architecture to the creation of dazzling visual effects. The study of light reflection unveils the intricate ways in which light interacts with surfaces, shaping the way we perceive and interact with our surroundings.



Reflection:- Reflection is the phenomenon where light changes direction upon striking a surface and returns into the medium it came from. This can occur with various types of waves, including electromagnetic waves like light.

*The mechanism of reflection involves two key concepts:

1. Incident Ray: This is the path that light travels before reaching a reflective surface. It's a line drawn perpendicular to the surface at the point where the light strikes.
2. Reflected Ray: This is the path that light takes after bouncing off the reflective surface.

Laws of Reflection:-

The laws of reflection determine the reflection of incident light rays on reflecting surfaces, like mirrors, smooth metal surfaces and clear water. Let's consider a plane mirror as shown in the figure above. The law of reflection states that:

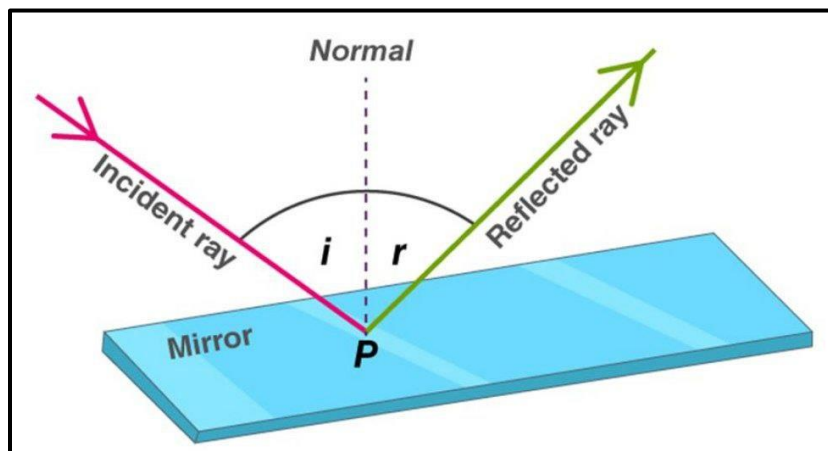


Figure shows the reflection of light

1. The incident ray, the reflected ray and the normal all lie in the same plane.
2. The angle of incidence = Angle of reflection.

Types of Reflection of Light:-

Different types of reflection of light are briefly discussed below:

- 1-Regular reflection
- 2- Diffused reflection
- 3- Multiple reflection

- 1- Regular reflection occurs when light rays are reflected in a single direction by a smooth surface, such as a mirror.

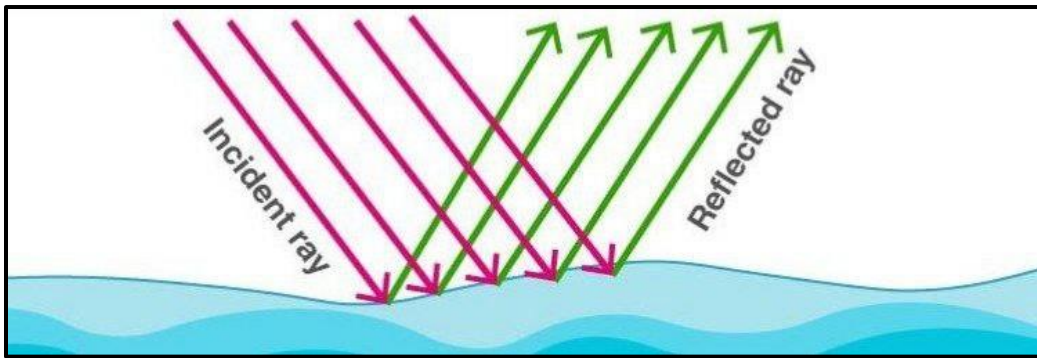


Figure shows the regular reflection of light

- 2- Diffuse reflection occurs when light rays are scattered in different directions by a rough surface, such as a wall.

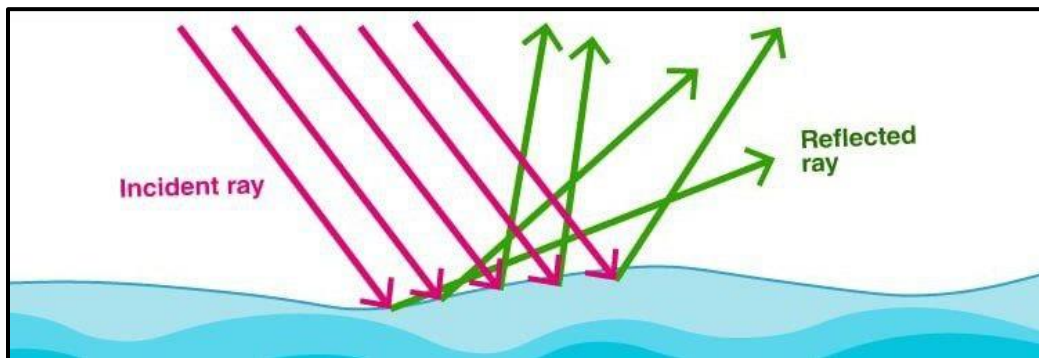


Figure shows the diffuse reflection of light

- 3- Multiple reflection which occurs when light rays are reflected more than once by two or more surfaces, such as in a periscope or a kaleidoscope.

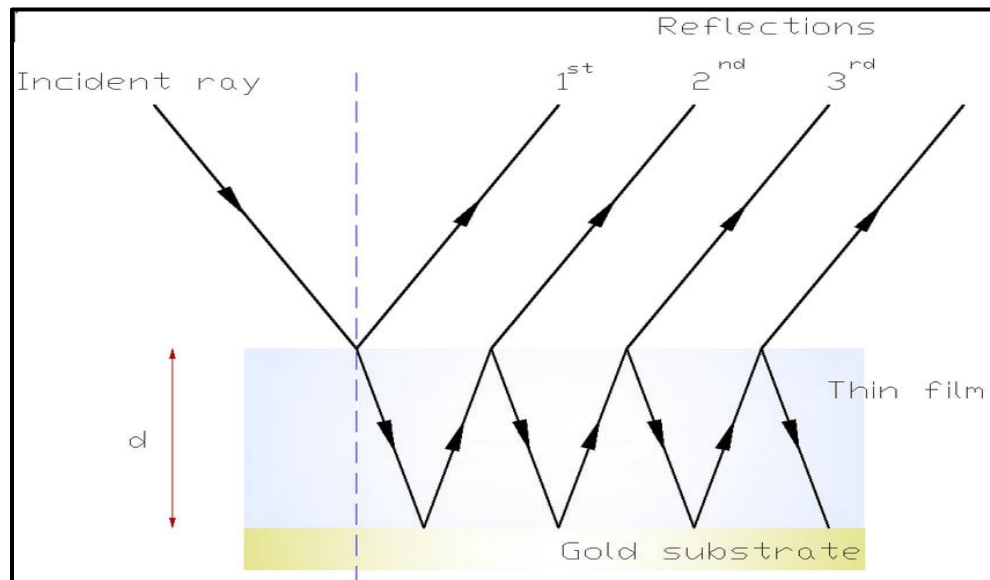


Figure shows the multiple reflection of light

The reflection of light has a wide range of practical applications such as:

- 1- Mirrors make use of specular reflection, allowing us to see clear images of ourselves and the surrounding environment.
- 2- The reflective surfaces of telescopes and cameras utilize the principles of reflection to capture and focus light, enabling us to observe distant objects.
- 3- The design of optical instruments such as microscopes, binoculars, and camera lenses relies on the behavior of reflected light to produce magnified and clear images.

- **Total internal reflection:**

Total internal reflection is a phenomenon in physics that occurs when a wave, such as a light wave, travels from a medium with a higher refractive index to a medium with a lower refractive index at an angle of incidence greater than the critical angle.

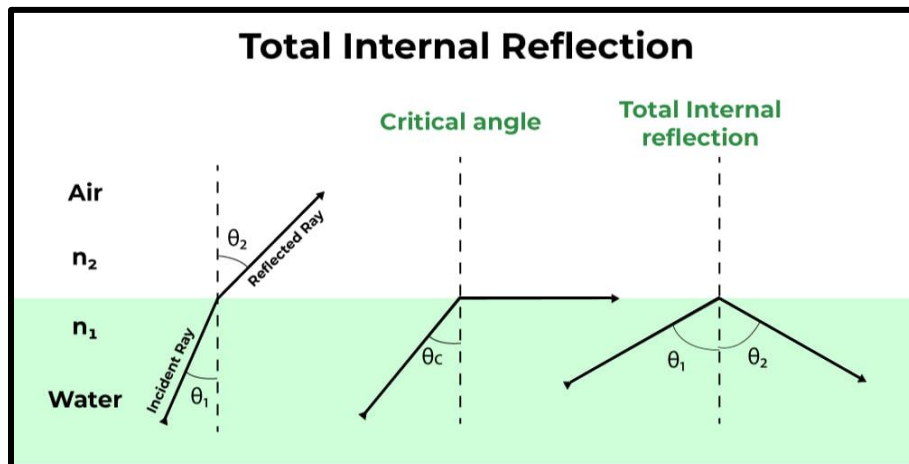


Figure shows the Total internal reflection of light