

Propagation of Light

Light propagates via scattering.

Why?

When considering light as a particle each time it encounters an object a collision occurs.

Light colliding with an object results in the photon being absorbed.

Since most absorptions result in excited states that decay, a photon is absorbed then a photon is emitted.

This is called scattering.

Rayleigh Scattering

- scattering that involves particles smaller than a wavelength

Scattering and Density

* Dense materials produce less lateral and reverse scattering due to destructive interference.

* Low density materials can scatter effectively in all directions.

Recall :

Constructive interference occurs when waves are in-phase and produce a larger disturbance.

Destructive interference occurs when waves are out-of-phase and produce a smaller disturbance.

Reflection

- backward scattering of light.

External Reflection

- reflection occurring as light passes from a less dense medium to a more dense material

Internal Reflection

- reflection occurring as light passes from a more dense medium to a less dense medium

Each type of reflection occurs because at a boundary interference patterns are interrupted.

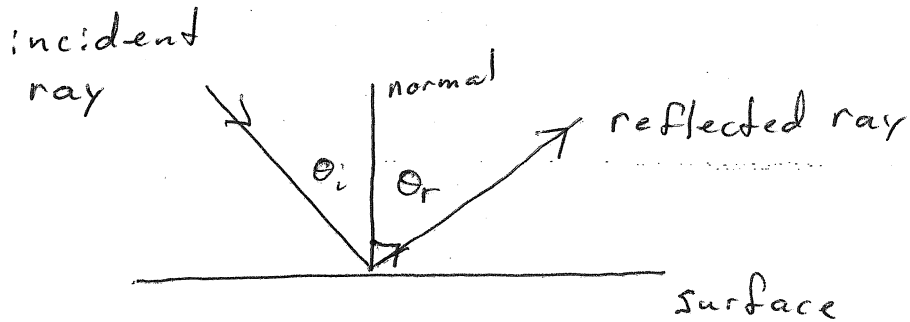
Reflection

- Law of Reflection

$\theta_i = \theta_r$ and incident and reflected rays lie in the same plane.

θ_i = angle of incidence

θ_r = angle of reflection

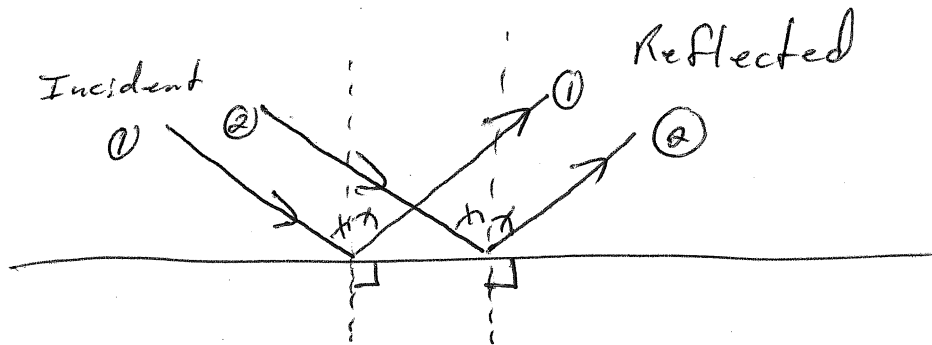


light ray

- line representing the direction of radiant energy.

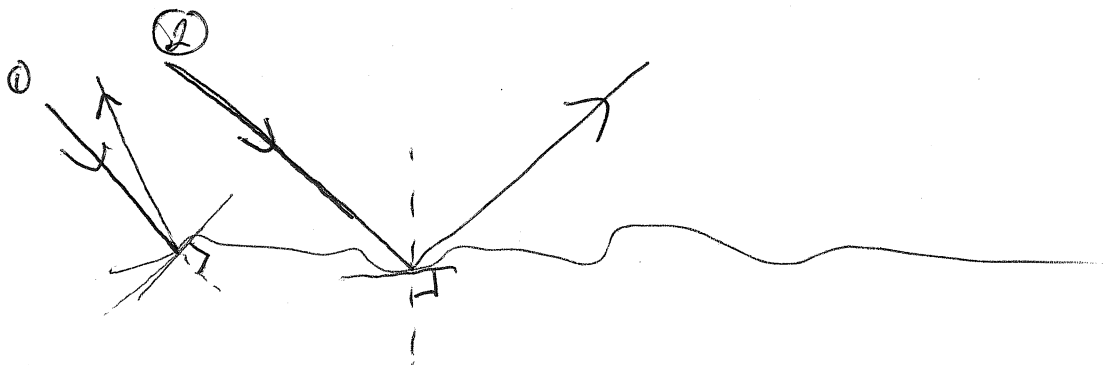
Specular Reflection

- type of reflection that is characterized by parallel incident rays being reflected parallel.



Diffuse reflection

- type of reflection that is characterized by parallel incident rays being reflected such that they are not parallel following reflection.



Diffuse reflection is responsible for the objects we see.

If specular reflection dominated vision we would only see objects that reflected light directly into our eyes. Everything else would not be seen.

Mirror

- optical instrument utilizing light reflective property.

* Plane Mirror

- Generates a virtual image
 - image is behind the mirror
- object and image are the same size.
- object and image are left-right reversed.