

# LIGHT ENERGY

Light energy is a form of energy which is responsible for the sense of sight in human eyes.

Speed of light in air -  $3 \times 10^8$  m/s

Speed of light in water -  $2.25 \times 10^8$  m/s

Speed of light in glass -  $2 \times 10^8$  m/s

Refraction: The change in direction of the path of light when it passes from one optically transparent medium to another.

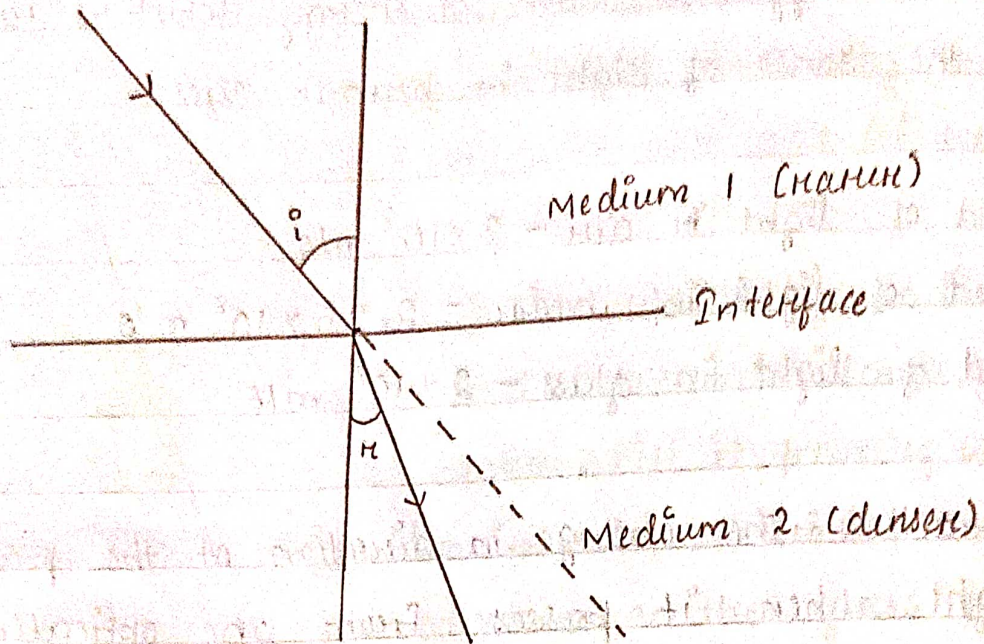
Cause of refraction: Speed of light changes with speed of light in medium.

Medium  $\rightarrow$  Optical density

Air - Rarest

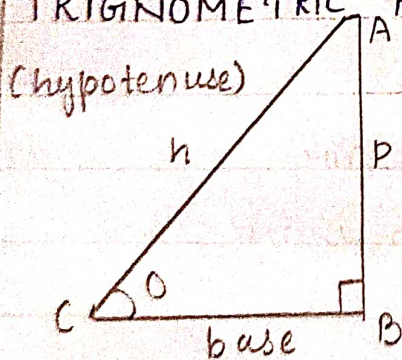
Water - Optically denser than air

Glass - Optically denser than water



Optical density - Optical density is the characteristic of the medium that decides the speed of light going through that medium.

### TRIGONOMETRIC RATIOS



$\theta$  theta,

$$\sin \theta = \frac{p}{h} = \frac{AB}{AC}$$

$$\tan \theta = \frac{p}{b} = \frac{AB}{BC}$$

$$\cos \theta = \frac{b}{h} = \frac{BC}{AC}$$

$\mu$  = Absolute refractive index

$\mu = \frac{c}{v}$  = Speed of light in air or vacuum

$v$  = Speed of light in a medium

e.g.  $\mu = \frac{c}{v_g}$  = Speed of light in air or vacuum

$v_g$  = Speed of light in glass

$$\mu_{\text{glass}} = \frac{3 \times 10^8}{2 \times 10^8}$$

$$2 \times 10^8$$

$\mu$  = relative refractive index

${}^w\mu_g$  = Refractive index of glass with respect to water

=  $\frac{\text{Speed of light in water}}{\text{Speed of light in glass}}$

Speed of light in glass

${}^1\mu_2$  = Refractive index of 2<sup>nd</sup> medium with respect to

1<sup>st</sup> medium =  $\frac{v_1}{v_2}$

$v_2$

Real depth = Refractive Index

Apparent depth

Since, refractive index of water is  $\frac{4}{3}$ , so the apparent depth is  $\frac{3}{4}$ <sup>th</sup> the real depth.