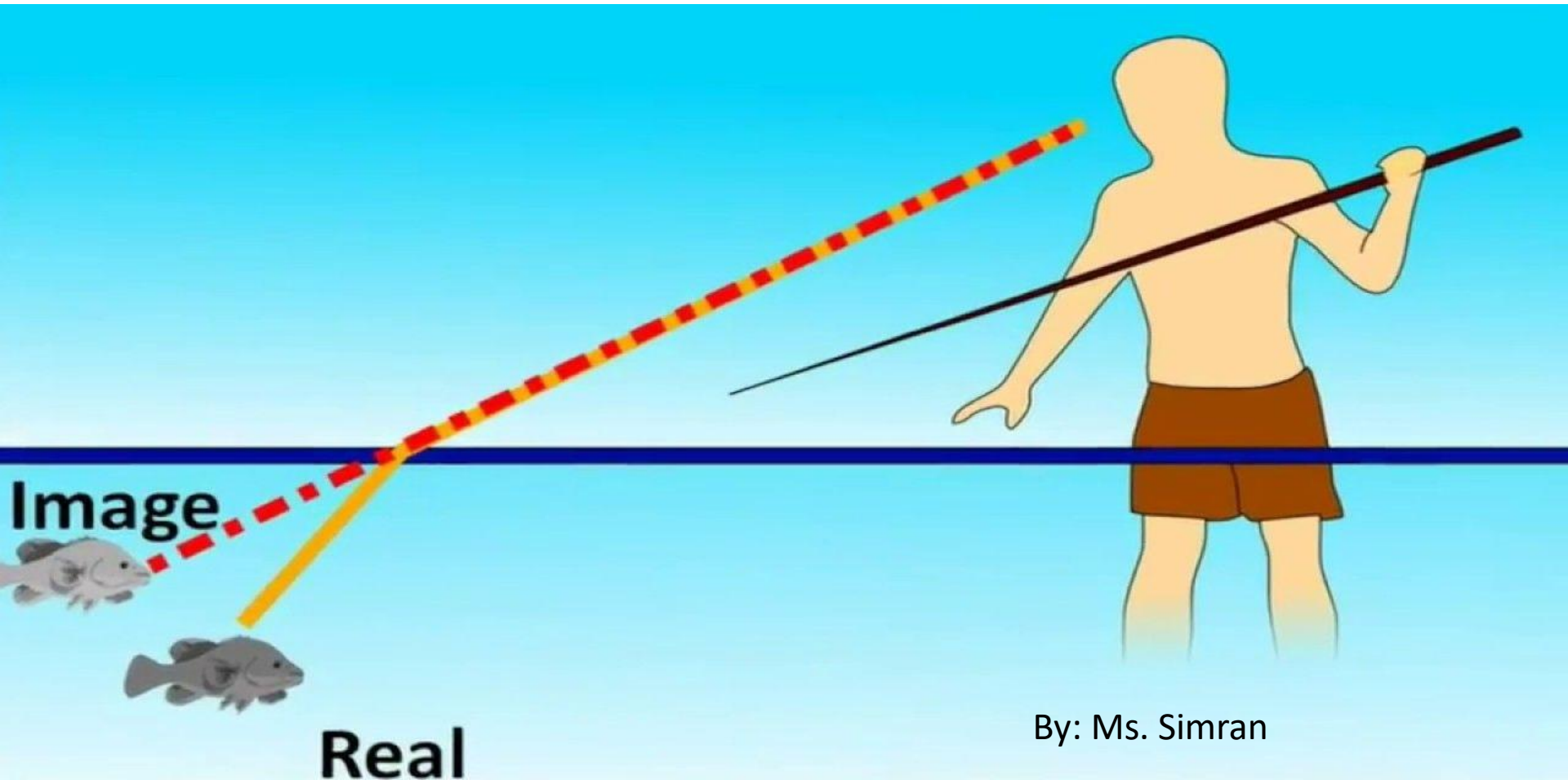


Refraction and Dispersion of Light

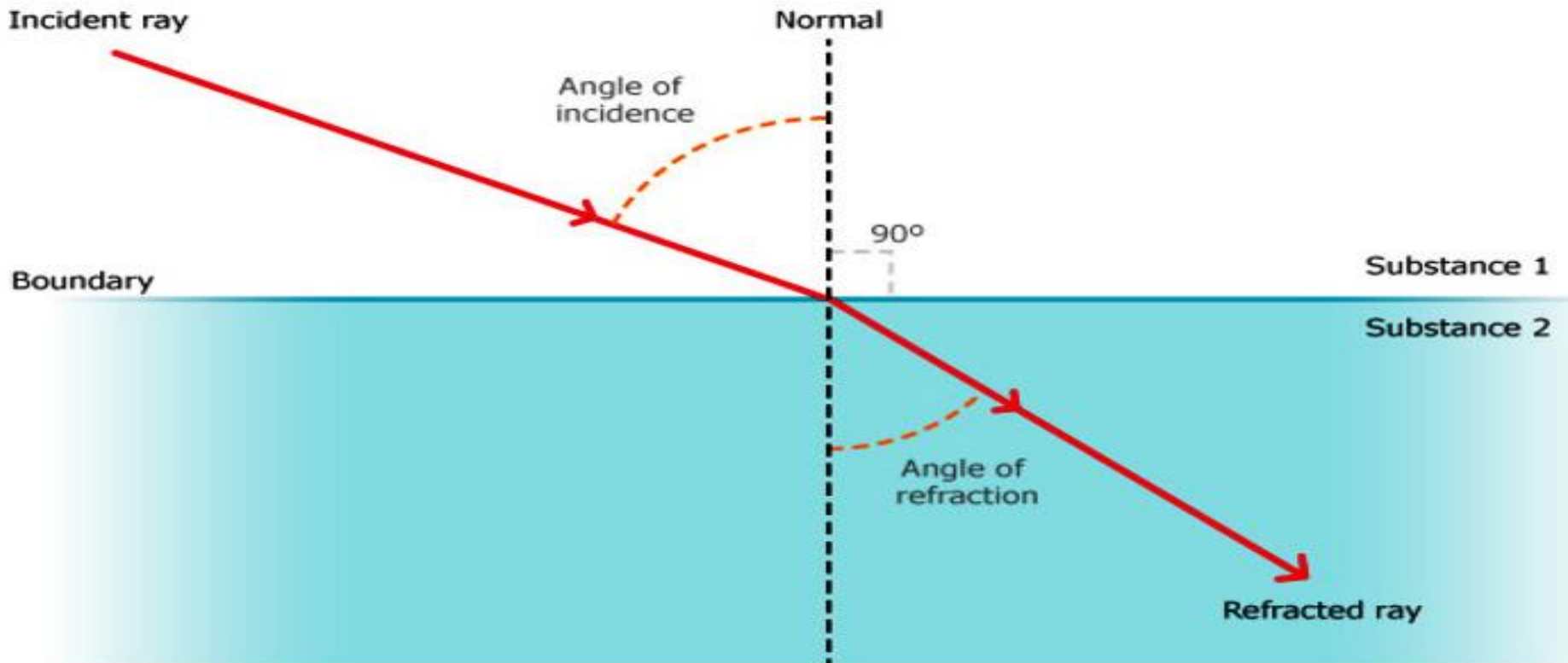


By: Ms. Simran

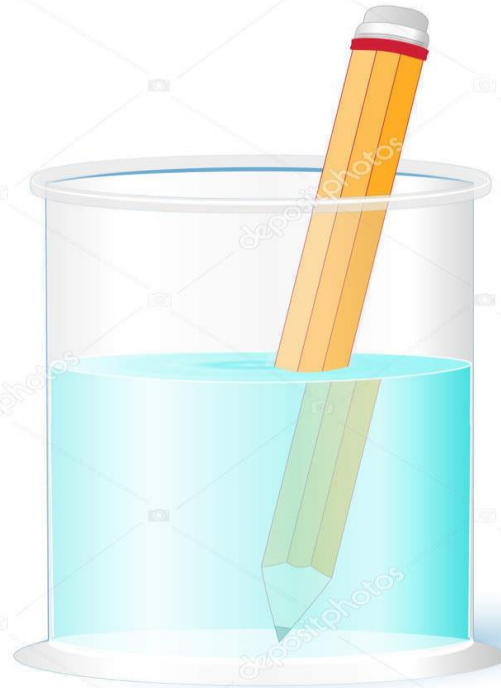
Refraction:

When a ray of light propagating in one transparent medium, enters another transparent medium, it is observed to change its direction of propagation, or to bend its path .

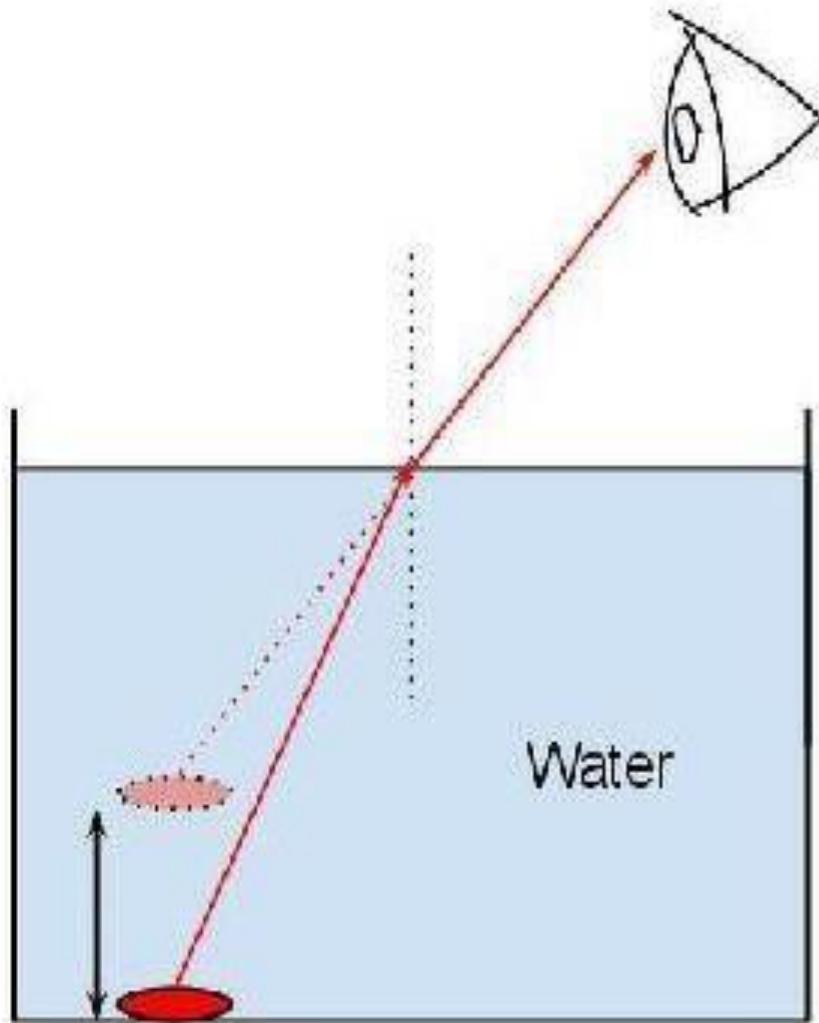
Refraction of light



Refraction



Refraction of light is responsible for the apparent shift in position of the coin under water. Refraction of light is defined as the bending of a ray of light, at the interface, while changing medium.



See the apparent shift in position of the red coin placed in water.

Refractive Index and Speed of Light

Refractive index of Medium 2 with respect to Medium 1 = $\frac{\text{Speed of Light in Medium 1}}{\text{Speed of Light in Medium 2}}$

$$n_{21} = \frac{\text{Speed of Light in Medium 1}}{\text{Speed of Light in Medium 2}}$$

Opposite is also true

Refractive index of Medium 1 with respect to Medium 2 = $\frac{\text{Speed of Light in Medium 2}}{\text{Speed of Light in Medium 1}}$

$$n_{12} = \frac{\text{Speed of Light in Medium 2}}{\text{Speed of Light in Medium 1}}$$

Solution :

Given :

Speed of light in vacuum = $3 \times 10^8 \text{ m/s}$

Speed of light in glass = $2 \times 10^8 \text{ m/s}$

We have,

Refractive index of medium (n) = $\frac{\text{Speed of light in vacuum}}{\text{Speed of light in medium (glass)}}$

$$\Rightarrow n = \frac{3 \times 10^8}{2 \times 10^8 \text{ m/s}} = 1.5$$

\therefore Refractive index of medium = 1.5

The speed of light in a sample of glass is 1.91×10^8 m/s. The speed of light in a vacuum is 3.00×10^8 m/s. What is the refractive index of this glass?

Given:

$$v = 1.91 \times 10^8 \text{ m/s (glass)}$$

$$c = 3.00 \times 10^8 \text{ m/s}$$

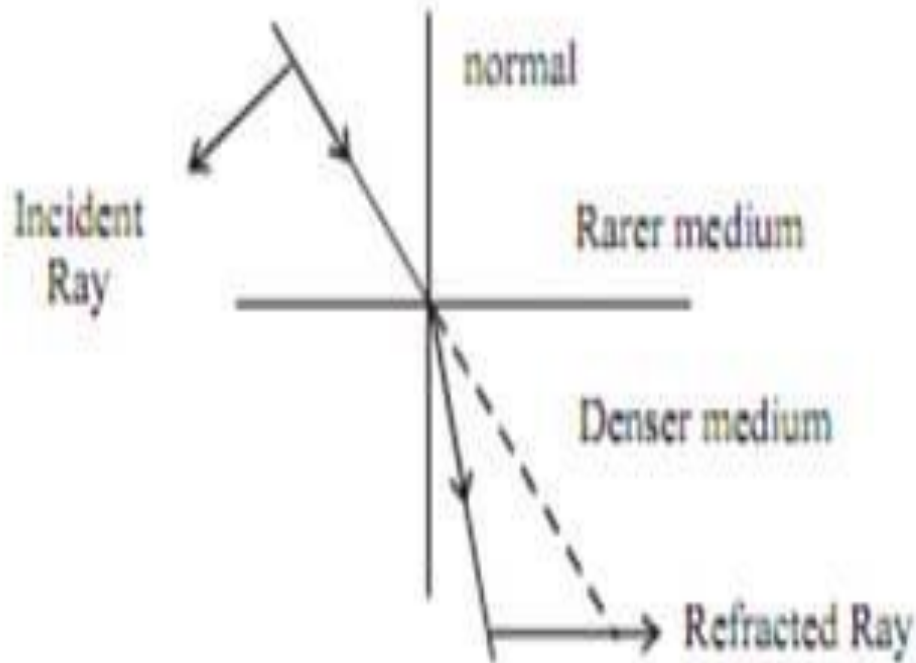
Required: n (glass)

Analysis: **Solution:**

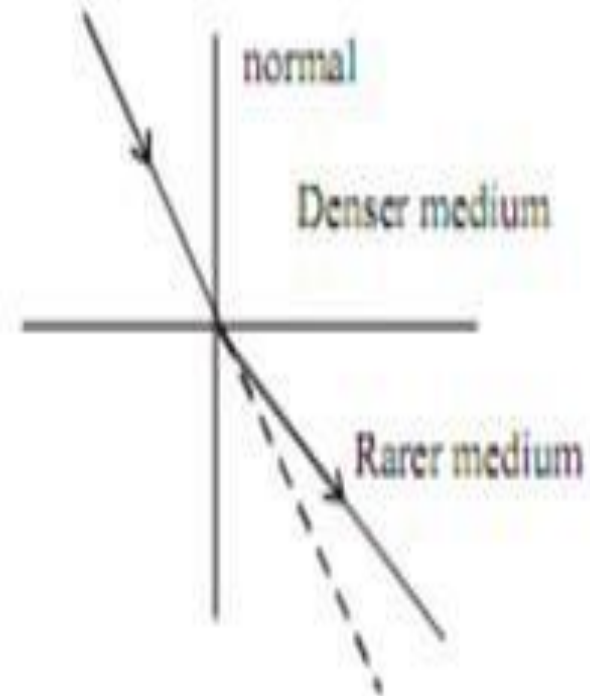
$$n = \frac{c}{v} = \frac{3.00 \times 10^8 \text{ m/s}}{1.91 \times 10^8 \text{ m/s}} = 1.57$$

Paraphrase: The refractive index of glass is 1.57

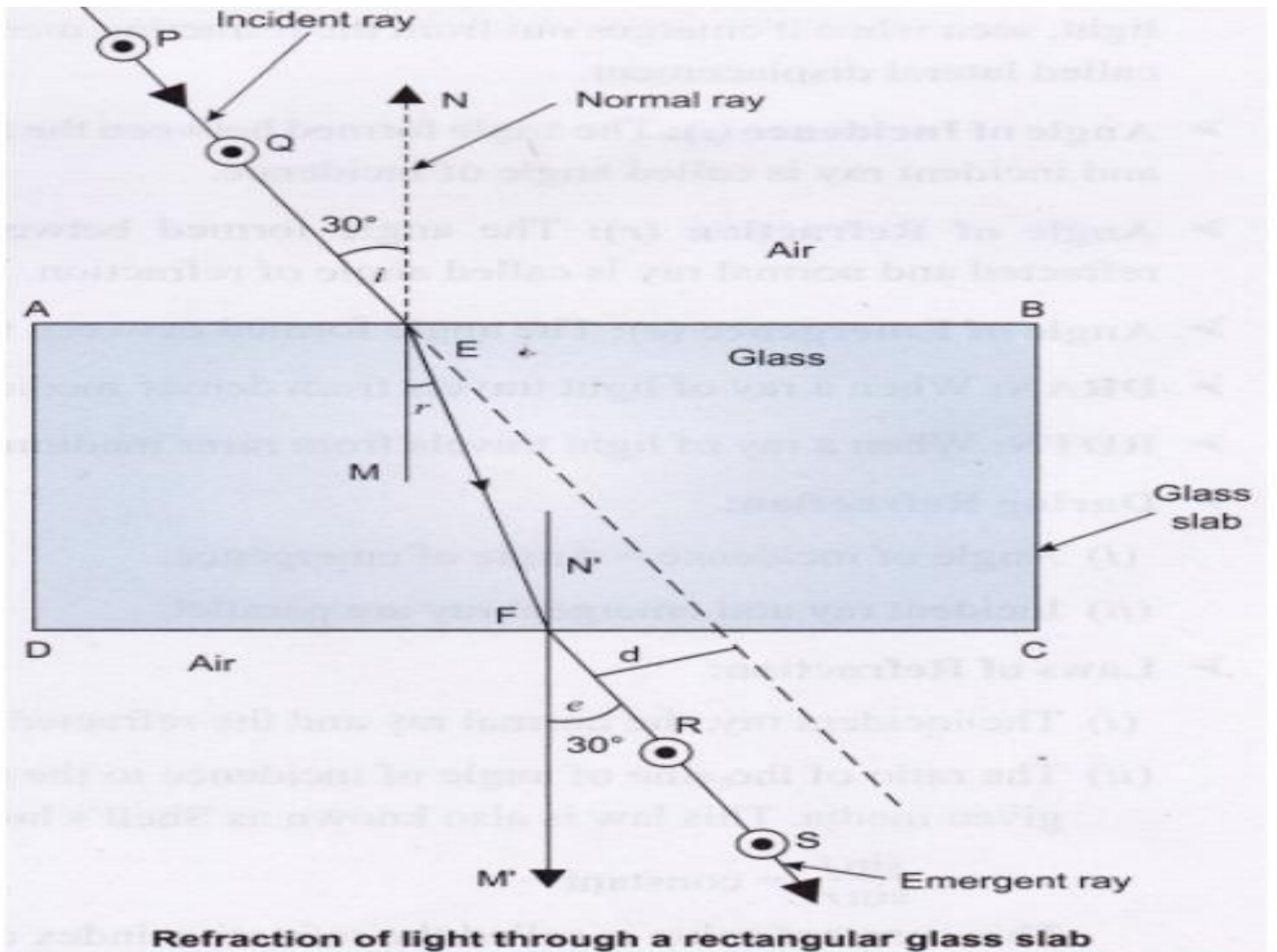
Rules of Refraction:



When ray travel from Rarer to Denser it bends towards normal after refraction



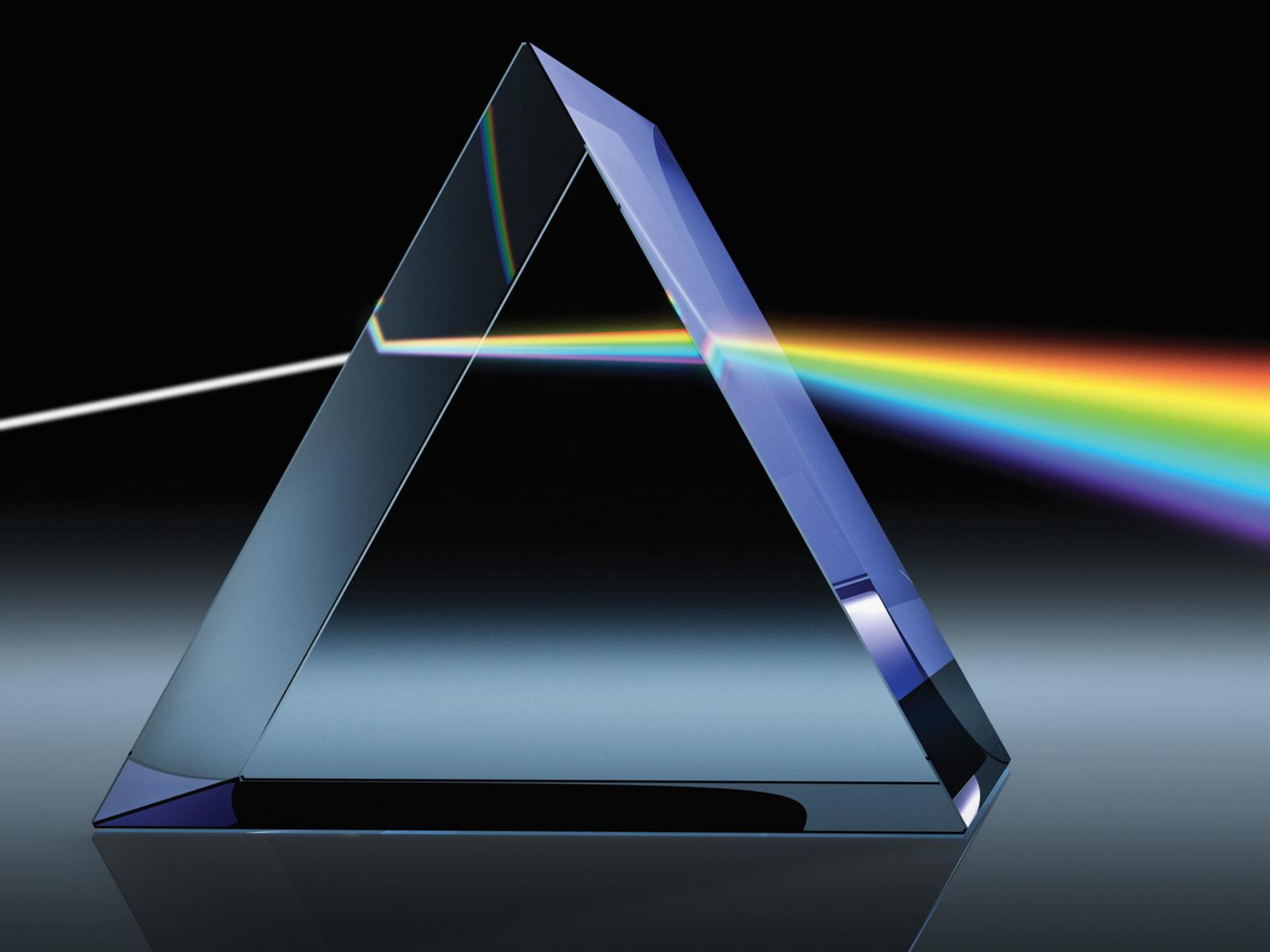
When ray travel from denser to rarer medium it bends away from normal



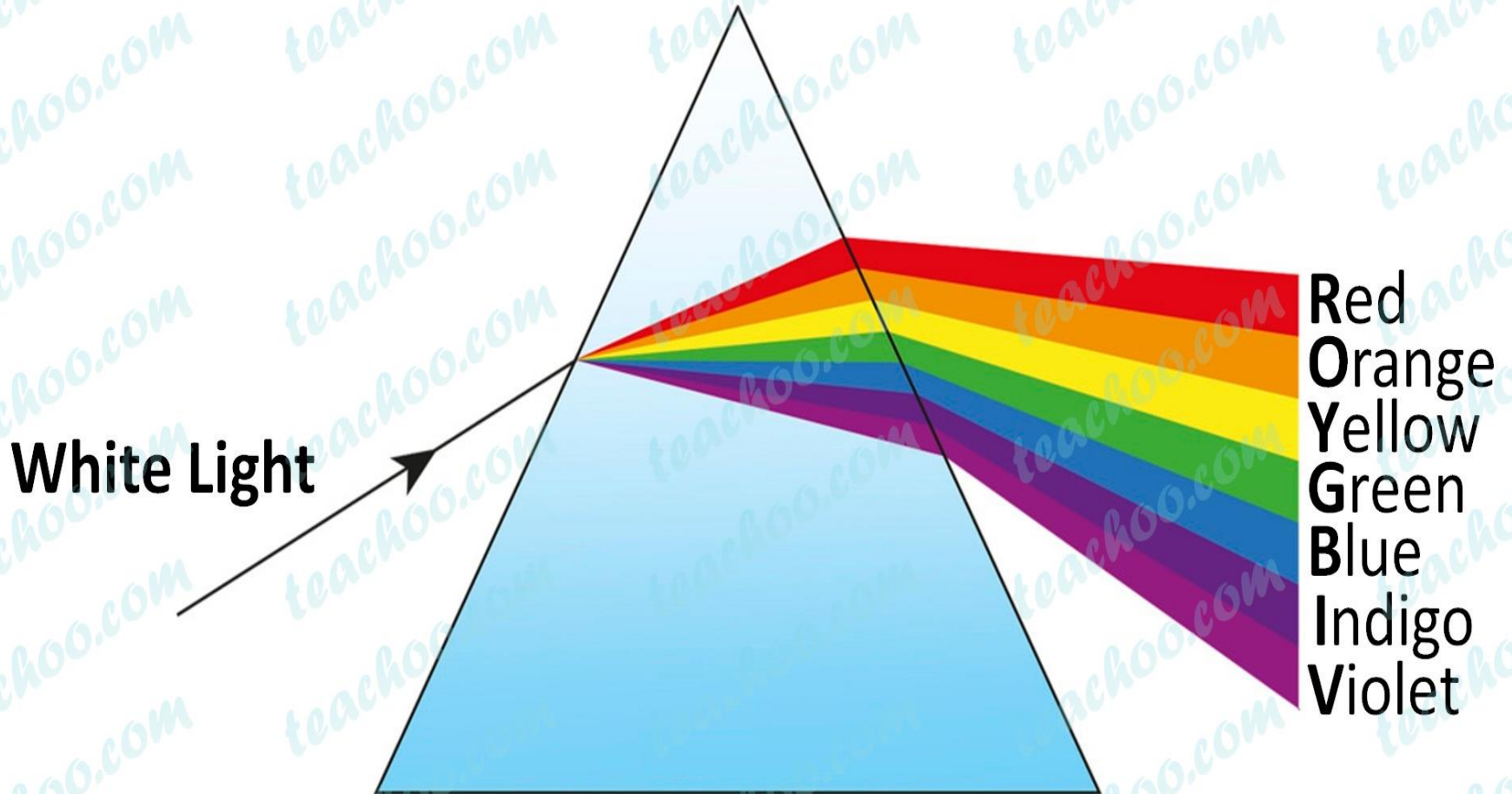
Refraction of light through a rectangular glass slab

Refraction through parallel faced glass slab ABCD:

1. The final refracted ray, RS is parallel to the incident ray, PQ. However, It is displaced, relative to the ray PQ, by an amount, d , say.
 2. The incident ray, PQ bends its path and moves along the direction MN within the glass slab.
- This phenomena is responsible for early rising and late setting of the sun.



Dispersion of White Light in a glass prism



PRISM: A prism is a piece of a transparent material bounded by two plane surfaces inclined at an angle.

- It was in the year 1686 when Sir Issac Newton did his well known experiments on the passage of white light through a glass prism.
- In his experiment, he observed that prism was not only deviating or bending an incident ray towards its base but was also splitting white light into seven colours.
- The phenomena of splitting of white light into seven colours is called **Dispersion**.

Rainbow –The Natural Effect of

