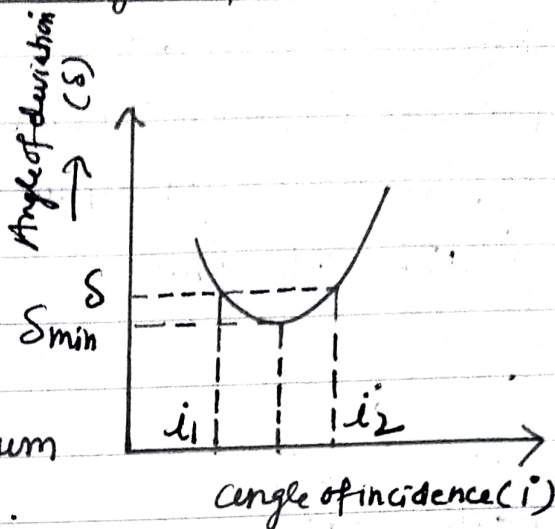


⇒ Dependence of angle of deviation on angle of incidence : →

(i-S graph)

The graph shows the variation of angle of deviation (δ) with angle of incidence (i). It is called the i-S curve in which the angle of minimum deviation is denoted by δ_m .



From the graph it is observed that when angle of incidence is equal to angle of emergence i.e. ($i_1 = i_2$) then angle of deviation is minimum (δ_m).

Also if prism is equilateral prism then $\angle r_1 = \angle r_2$, the refracted ray inside the prism is parallel to base.

Also from relation;

$$\angle i_1 + \angle i_2 = A + \delta \quad \text{--- (1)}$$

for $\delta = \delta_m$, $i_1 = i_2 = i$ (under minimum deviation)
So Eqⁿ (1) becomes

$$A + \delta_m = 2i$$

$$\text{or } \boxed{\delta_m = 2i - A}$$

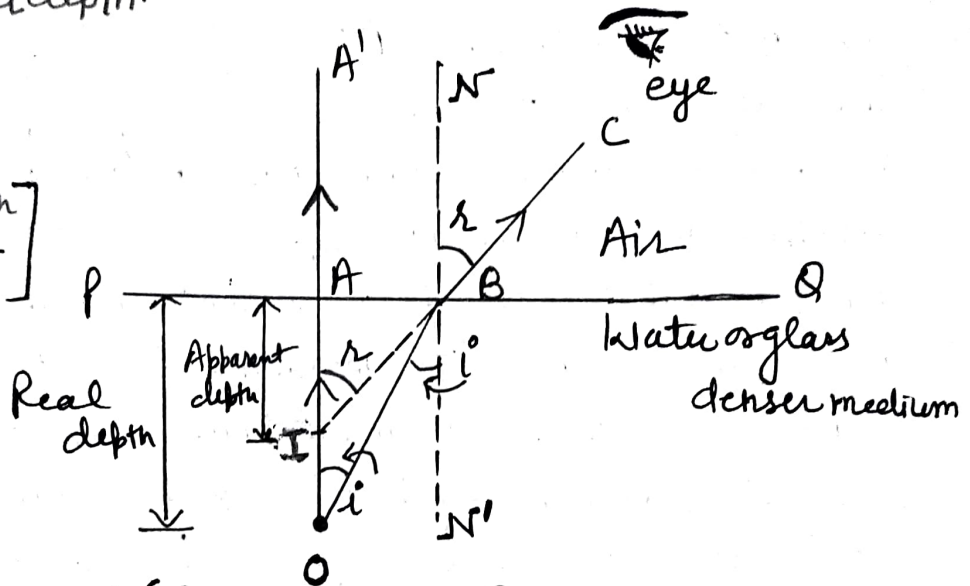
* All other values of δ , (apart from minimum deviation), two other values of angle of incidence i_1 and i_2 are obtained as shown by the dotted curve in the graph.

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⇒ Apparent depth :→ Due to refraction of light, an object placed in denser medium when viewed through a rarer medium, appears to be at depth lesser than its real depth. This depth is apparent depth.

In Diagram;

[AO → Real depth
AI → Apparent depth]



(Diagram shows Real depth & Apparent depth)

When viewed by the eye, the ray BC appears to come from point I which is virtual image of object O. Thus any object for e.g. coin placed at O, when seen from air, will appear to be at point I, which is at lesser depth i.e. AI than its actual depth i.e. AO.

$$\frac{\text{Real Depth}}{\text{Apparent Depth}} = \mu_m$$

(m-medium)
(a-air)

or simply ;

$$\frac{\text{Real depth}}{\text{Apparent Depth}} = \mu$$

Shift OI = AO - AI
(Real Depth - Apparent depth)

⇒ Shift depends upon following factors:

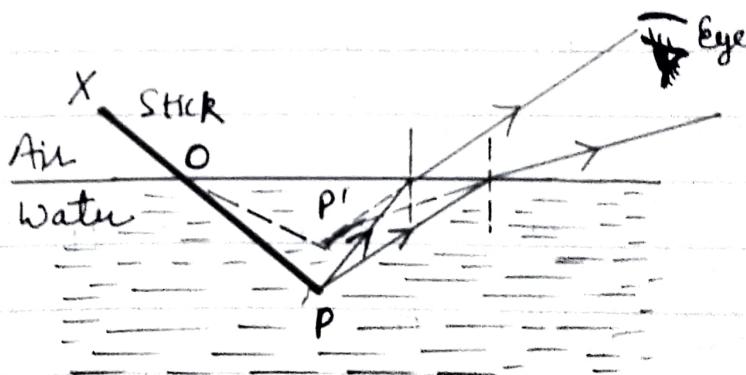
(i) Refractive Index: → Higher the refractive index of the medium, more is the shift.

(ii) thickness of denser medium: → Thicker the medium, more is the shift.

(iii) Wavelength or Colour of light: → Shift decreases with increase in the wavelength of light used. As $\lambda_R > \lambda_v$ and $\mu_R < \mu_v$. So, shift is more for violet light than for red light in a given medium.

⇒ Apparent Bending of a stick under water: →

The portion OP of a stick under water when seen from air appears to be shortened and raised up as OP'. This occurs due to refraction of light from water to air.

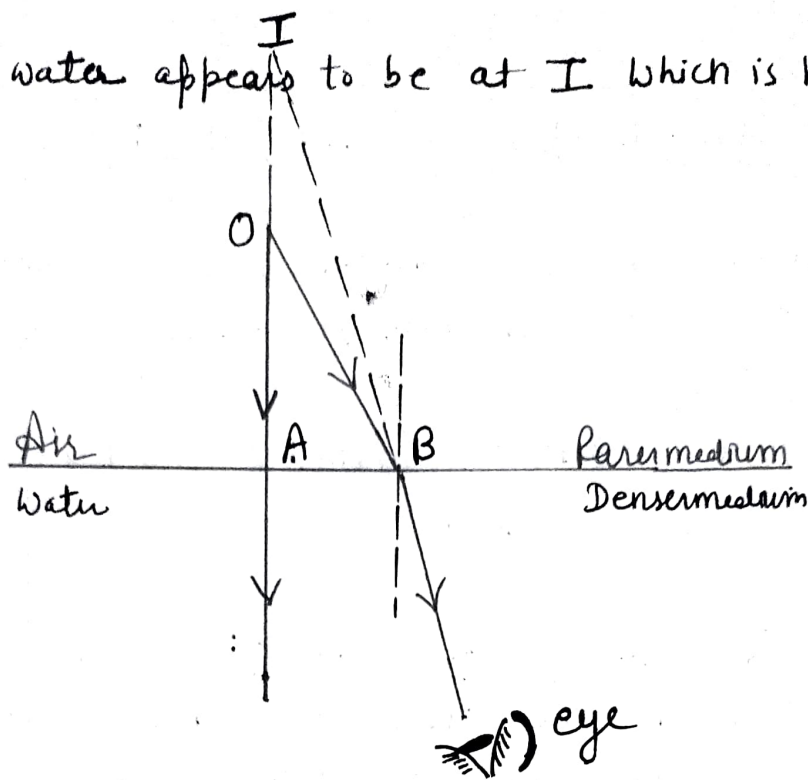


P' is the virtual image of point P.

⇒ An object placed in rarer medium when viewed from a denser medium appears to be at a greater distance than its real distance. →

O is the object placed in rarer medium (air) when viewed

From inside water appears to be at I which is higher than object O.



⇒ Consequences of Refraction of Light: →

(i) twinkling of stars.

(ii) The printed paper appears to be raised when a glass slab is placed over it

(iii) A water tank appears shallower than its actual depth.

(iv) A person's legs as seen from outside appear to be short when standing in a pool or water tank.

