

Home Assignments

29/6/21

Q1) What are the two conditions require for total internal reflection?

Q2) A fish in the pond of water appears at a depth of 6 cm. What is the actual depth of the fish if the refractive index of air w.r.t water is $\frac{3}{4}$?

Q3) A rectangular glass slab of the thickness 8 cm is placed on a figure. Above this slab if the refractive index of the glass is 1.6, then by what distance the figure will appear to rise?

Answers

Ans 1) * The light ray must travel from a denser to a rarer medium.

* The angle of incidence in the denser medium must be greater than the critical angle for that pair of media.

Ans 2) Apparent Depth = 6 cm

$$\text{(air w.r.t water)} \quad \frac{R.I.}{4} = \frac{3}{4}$$

A.I Speed of light in air = 3×10^8 m/s

Let the speed of light in water be μ m/s

$$\text{So, } \frac{\mu}{3 \times 10^8} = \frac{3}{4}$$

$$\Rightarrow 4\mu = 9 \times 10^8$$

$$\Rightarrow \mu = \frac{9}{4} \times 10^8$$

$$\Rightarrow \mu = 2.25 \times 10^8 \text{ m/s}$$

$$\text{R.I of water wrt air} = \frac{3 \times 10^8}{2.25 \times 10^8}$$

$$= 1.33$$

$$\text{Real depth} = \frac{\text{Apparent depth}}{R.1}$$

$$= \frac{6}{1.33}$$

$$= 4.51$$

∴ The actual depth of the fish is
4.51 cm

Q3 Ans Real depth - 8 cm
Refractive Index - 1.6

$$\text{Apparent depth} = \frac{\text{Real depth}}{\text{Refractive Index}}$$

$$= \frac{8}{1.6} \text{ cm}$$

$$= 5 \text{ cm}$$

$$\begin{aligned} \text{Normal Shift} &= \text{Real depth} - \text{Apparent depth} \\ &= 8 - 5 \text{ cm} \\ &= 3 \text{ cm} \end{aligned}$$

\therefore The glass will appear to raise ^{by} 3 cm.