

Q 2: What are the two conditions required for total internal reflection?

Ans Two conditions are: -

- 1) Angle of incidence should be greater than critical angle.
- 2) Ray should travel from denser to rarer medium.

Q 2: 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  $\frac{3}{4}$ ?

Ans It is given that a fish is 30 cm below the water surface in a still pond.

$\therefore$  Real depth of the fish is

$$d = 30 \text{ cm}$$

$$\text{Refractive index} = \frac{3}{4}$$

We know that the refractive index of medium can be calculated as the ratio of real depth to apparent depth.

$$\text{i.e. } \mu = \frac{\text{real depth}}{\text{apparent depth}}$$

$$\mu = \frac{4}{3}$$

Substituting the above equation, we get -

$$\Rightarrow \frac{4}{3} = \frac{\text{real depth}}{\text{apparent depth}}$$

$$\Rightarrow \text{apparent depth} = \frac{\text{real depth}}{\frac{4}{3}}$$

on substituting value of real depth,

30 cm

$$\begin{aligned} \Rightarrow \text{apparent depth} &= \frac{30 \text{ cm}}{\frac{4}{3}} \\ &= 22.5 \text{ cm} \end{aligned}$$

3. A rectangular glass slab of thickness 8 cm is placed on a figure. The eye is kept exactly above this slab. If the refractive index of glass is 1.6, then by what distance the ~~fig~~ figure will appear to raised?

Ans

$$\text{apparent depth} = \frac{\text{real depth}}{\text{refractive index}}$$

$$\text{apparent depth} = \frac{8}{1.6}$$

$$= \frac{80}{16} = 5 \text{ cm}$$

$$\text{Normal shift} = \text{real depth} - \text{apparent depth}$$

$$= 8 - 5 = 3 \text{ cm}$$