What is the relation between refractive index and thickness of glass slab?

Answer:

In optics the refractive index or index of refraction n of a substance is a dimensionless number that describes how light, or any other radiation, propagates through that medium. It is defined as

$$n = \frac{c}{v}$$

where c is the speed of light in vacuum and v is the speed of light in the substance. So, refractive index is feature of the material.

Glass slab is it an object made of glass having 3 dimensions and is cuboid shaped.

So, thickness of the glass slab is feature of object (the glass slab).

Thus there is no general relation between refractive index and thickness of glass slab, but if some problems when additional information is available other physical properties of an object can be calculated from refractive index and thickness, for example optical path length. The optical path length as defined in optics is the length of the path multiplied by the index of refraction of the medium.

Example problem:

A postage stamp placed under a glass, appears raised by 15 mm. If refractive index of glass is 1.5, calculate the actual thickness of glass slab?

Solution:

Let real thickness of glass = x

Apparent thickness = (x – 15 mm)

We know

$$n = \frac{Real\ thickness}{Apparent\ thickness}$$

$$1.5 = \frac{x}{x - 15mm}$$

$$1.5\,x - 22.5\,mm = x$$

$$x = 45\ mm.$$