University of Batna2
Faculty of Medicine
Pharmacy Department
Module of Pharmaceutical Physics

**Exercise N°1:**

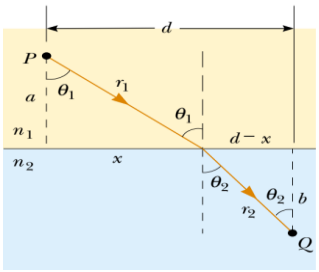
A red light from a laser has a wavelength $\lambda_1 = 0.6329923 \pm 10^{-7}\ \mu m$. Calculate the wavelength of the radiation emitted in the air of index $n_2 = 1.00028 \pm 10^{-5}$.

**Exercise N°2:**

The retina of human eye can detect light when radiant energy incident on it is at least $4 \times 10^{-17} J$. For light of *600 nm* wavelength, how many photons does this correspond to?

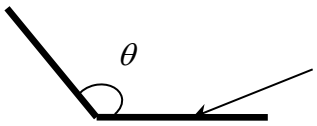
**Exercise N°3:**

Prove that when light goes from one point *P* in medium *1* to point *Q* in medium *2* (see figure), the path chosen is the one which takes the least time (Fermat's principle).



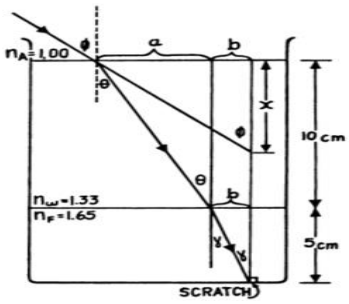

**Exercise N°4:**

Two plane mirrors make an angle of $\theta$ with each other, as illustrated in figure. A ray is incident on mirror $M_1$ at an angle of $i_1$ to the normal. Find the angle between the ray incident on the first mirror and the ray reflected off of the second mirror. Determine the total deviation when two flat mirrors are perpendicular to each other.



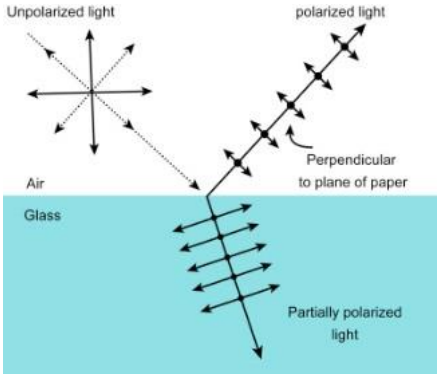

**Exercise N°5:**

A block of flint glass, of refractive index *1.65* and of depth *5 cm*, rests on the bottom of a beaker of water. The surface of the water is *10 cm* above the top surface of the glass block. What is the apparent depth of a scratch on the inside of the bottom of the beaker below the surface of the water?



## Exercise N°6:

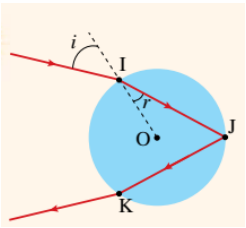
The angle at which an unpolarized ray of light reflects a totally plane-polarized light is called a Brewster angle. What is the refractive index of a piece of glass if the light of the green mercury line (*546.1 nm*) is plane-polarized when reflected at an angle of *58°*?




## Exercise N°7:

A ray of light incident on a transparent sphere at an angle *i* and refracted at an angle *r*, emerges from the sphere after suffering one internal reflection.

1. Find an expression for the angle of deflection *D=f(i,r)*.
2. Find the angle *i* which produces minimum deflection.




## Exercise N°8:

An optic fiber may have a core of dense flint, $n_1 = 1.66$, and a coating of crown glass, $n_2 = 1.52$. What is the highest angular aperture (half angle of the cone of light entering the fiber) for light that is transmitted through the straight fiber?