

In-Class Quiz

Explain, in your own words (sketches allowed), the following terms:

1. Reflection
2. Refraction
3. Dispersion

In-Class Quiz Answers

1. Reflection: when no incident light on the other side of a material. Could also say that the incident angle θ_i and the reflective angle θ_r are equal:

$$\theta_i = \theta_r \quad (1)$$

For example, when using a mirror.

2. Refraction: the bending of light when it moves from one medium to another. Involves two transparent materials with different indices of refraction. *The bending of light at the interface*. Governed by Snell's Law:

$$n_1 \sin \theta_1 = n_2 \sin \theta_2 \quad (2)$$

3. Dispersion: when the angle of refraction is different for each wavelength of input light. When the index of refraction of a material depends on the wavelength (e.g. with air and a glass prism). Examples: rainbow, prism
4. Diffraction: (Bonus) when light enters a curved surface

Optical Phenomena

Reflection

1. $\theta_i = \theta_r$
2. if you have a perfectly flat mirror, parallel incident light will reflect in parallel (*Specular reflection*)
3. if your surface is *not* flat, parallel incident light will *not* reflect in parallel (*Diffuse reflection*)

Refraction

1. with transparent materials of different indices of refraction, initial material of index n_1 and other medium of index n_2 ,

$$n_1 \sin \theta_1 = n_2 \sin \theta_2$$

2. $n_1 > n_2$: the larger n_2 is, the smaller θ_2 becomes
3. can infer relative index magnitudes by comparing angle of incidence to angle of refraction

Critical Angle

$$\sin \theta_c = \frac{n_2}{n_1}$$

critical angle is dividing line between two different behaviors:

1. if $\theta < \theta_c$, reflected & refracted light
2. if $\theta = \theta_c$, reflected \cong refracted: exactly along the interface between the two materials
3. if $\theta > \theta_c$, no reflected light (*total internal reflection*)

Water Tank Problem

[discuss with Dr. Frohlic!](#)

*Undergraduate ECE/Physics, NCSU, Raleigh, NC 27705. E-Mail: jmlynch3@ncsu.edu