PY 202, 4/3/17

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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:
$$\theta_i = \theta_r \tag{1}$$
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:
$$n_1 \sin\theta_1 = n_2 \sin\theta_2 \tag{2}$$
3. Dispersion: when the angle of reflection 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

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

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!

Polarization

Assume wave traveling to right:

Propagation

WTP Image

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