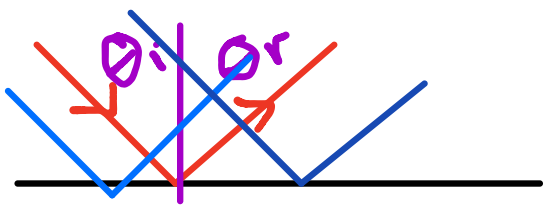
Reflection, Refraction, Absorption, Diffraction Notes:

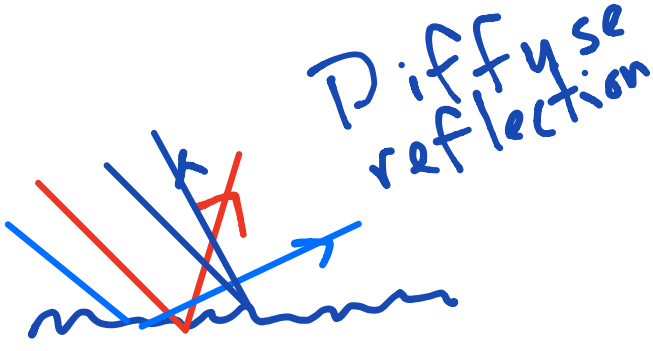
When a wave changes from one medium to another it can:

1. Absorption - the wave's energy is gained by the new medium
   - the new medium will get hotter
2. Reflection - when the wave does not enter the medium and its energy bounces back.

   Law of Reflection - the angle of incidence is equal to the angle of reflection. $\theta_i = \theta_r$

   Smooth surfaces create images





3. Diffraction – when a wave encounters a medium with a hole or a medium that is smaller than its wavelength.
- waves bend, creating a semi-circular pattern.

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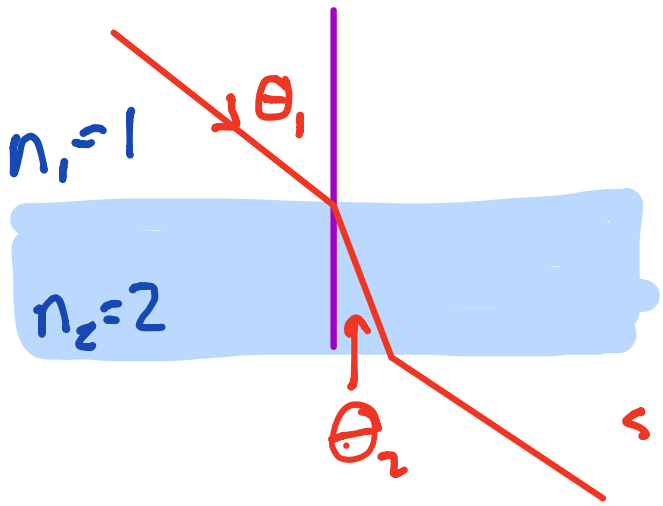
4. Refraction – wave bends as it enters a new medium

index of refraction – ratio of the speed of light in a vacuum to the speed of light in the material

$$n = \frac{c}{v}$$ no units usually 1-3

Snell's Law

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



$\theta_1 = 45°$

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

$1 \cdot \sin 45 = 2 \sin\theta_2$

$\sin^{-1}\frac{.707}{2} = \theta_2$

$\theta_2 = 20.7°$

Total internal reflection
- when going from high n to a low n there is angle that causes all light to reflect.

$$\theta_{crit} = \sin\frac{n_2}{n_1}$$

This is how optical fibers work.