



See the beauty of God's creation
reflected in this picture!



Vincent van Gogh Starry Night over the Rhône 1888. Musée d'Orsay

Law of Reflection: "When a wave strikes a boundary it reflects back into the incident medium at the angle it strikes at."

$$\theta_1 = \theta_2 \quad \theta \text{ always measured from the normal}$$

<http://www.phy.ntnu.edu.tw/java/light/flashLight.html>

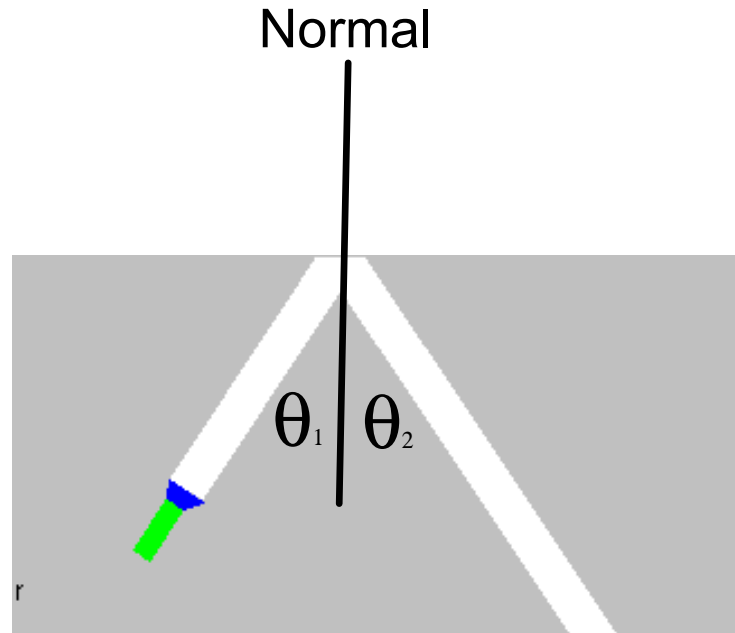
use straight up first

<http://www.walter-fendt.de/ph11e/refraction.htm>

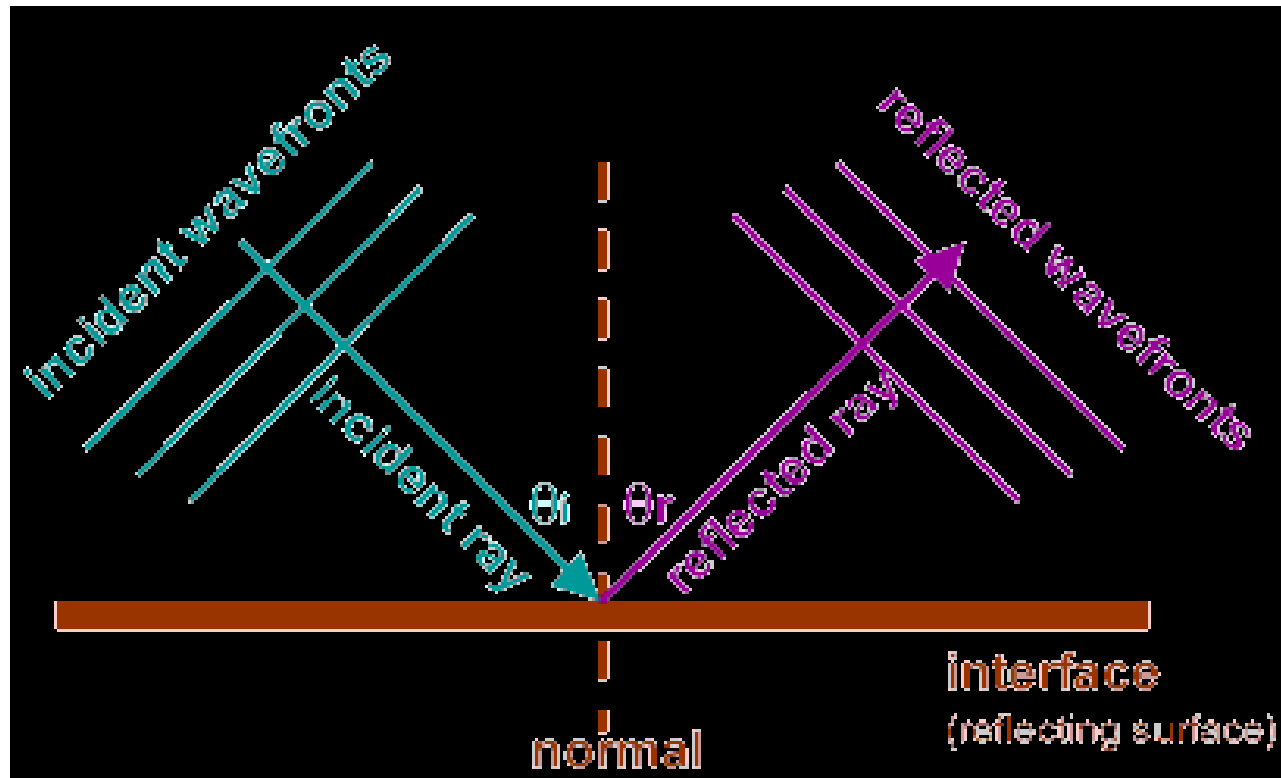
shows angles

Law of Reflection

Reflected wave



$$\theta_1 = \theta_2$$



Law of Reflection

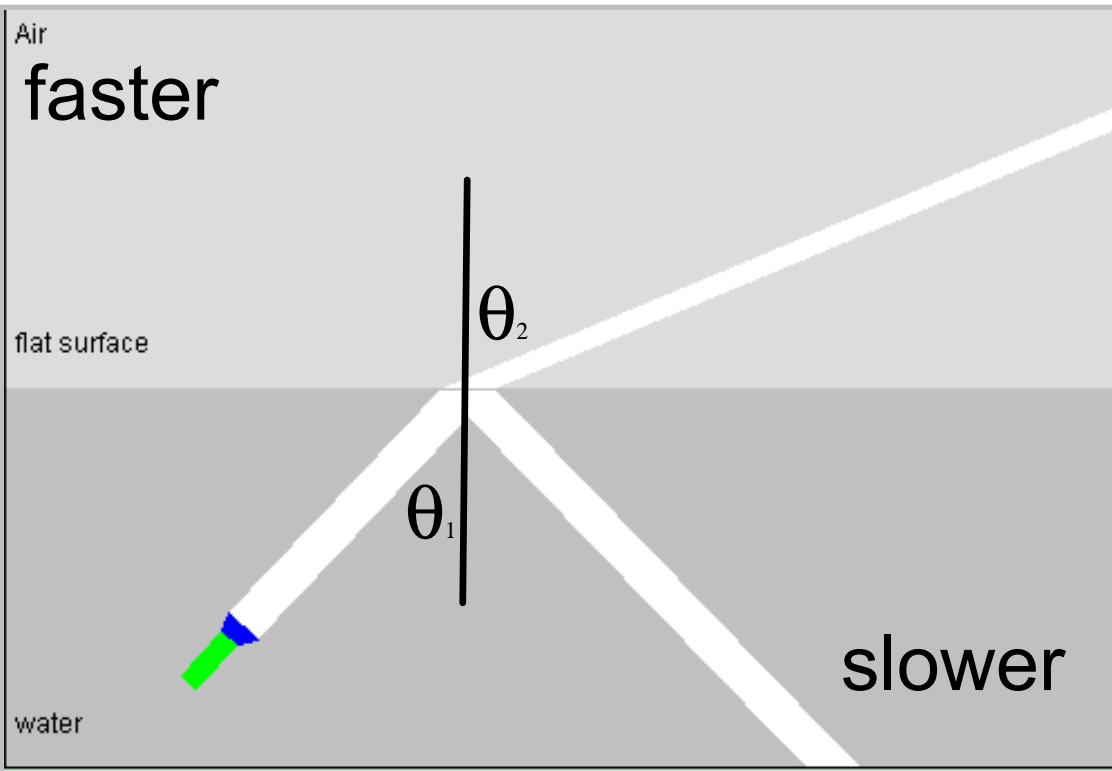
$$\theta_1 = \theta_2$$

Refraction: *"When a waves strikes a boundary between two mediums at an angle it is bent as it passes into the new medium"*

Transmitted wave

Law of Refraction

$$\frac{\sin \theta_1}{\sin \theta_2} = \frac{v_1}{v_2} = \frac{n_2}{n_1}$$

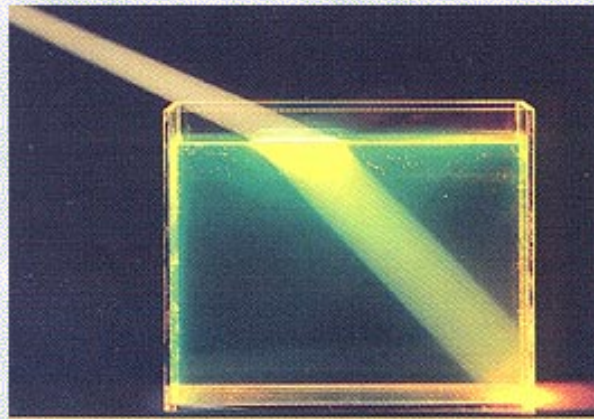


Light travels faster in air and slower in water!

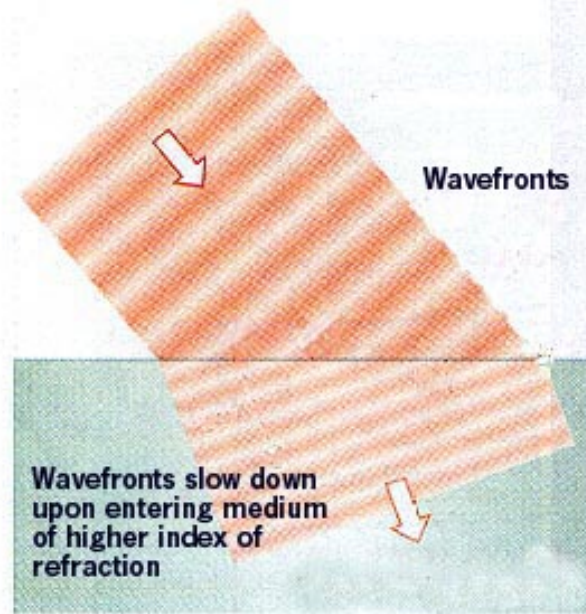
- 1) Waves bend "away from the normal" when they travel from a slower to a faster medium.
- 2) Waves bend "toward from the normal" when they travel from a faster to a slower medium.

$$\frac{\sin \theta_1}{\sin \theta_2} = \frac{v_1}{v_2} = \frac{n_2}{n_1}$$

Refraction: The Bending of Wavefronts



One side of wave front slows down, and the entire train of fronts twists. Analogy: right front tire of vehicle enters mud, twisting vehicle to the right.

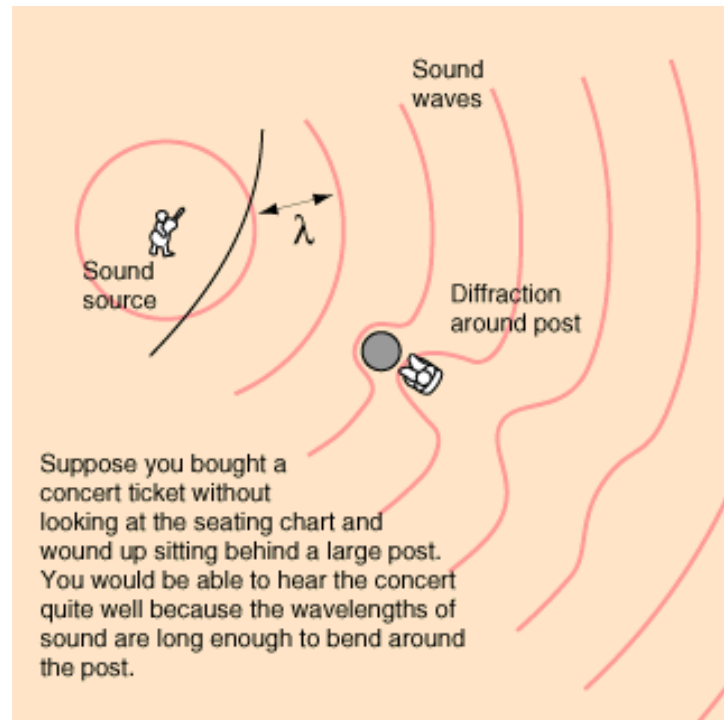


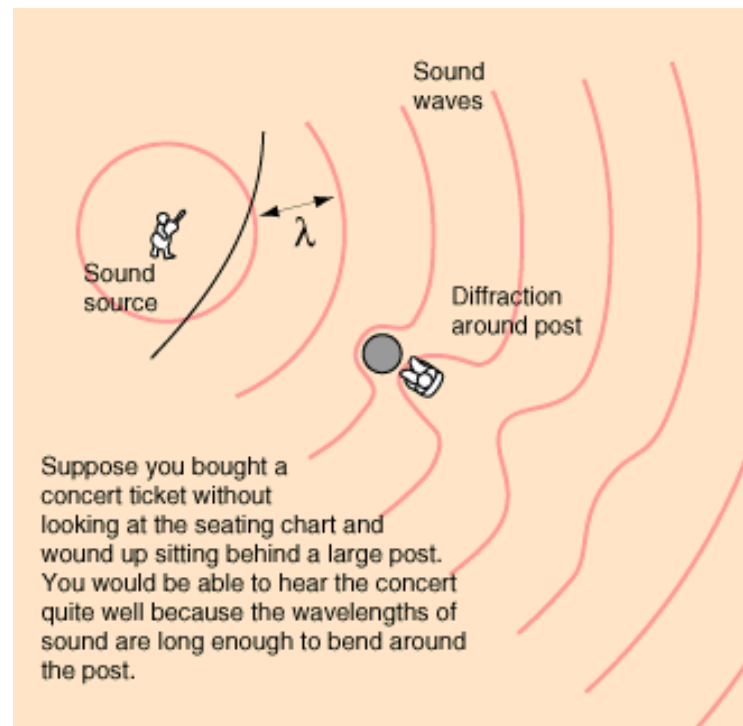
Refraction

Diffraction

When a wave bend around an obstacle, or as it passes through an opening

<http://www.launc.tased.edu.au/online/sciences/physics/diffrac.htm>





Interference patterns

 <http://www.ngsir.netfirms.com/englishhtm/Interference.htm>

click to show const/dest interference

Figure 22.7: Diffraction of waves through a slit

