

Refraction

Refraction

Objectives

Define Refraction.

Understand the purpose of the index of refraction.

Use Snell's Law to calculate the angle of refraction or index of refraction.



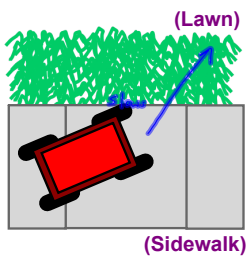
Refraction

bending of light

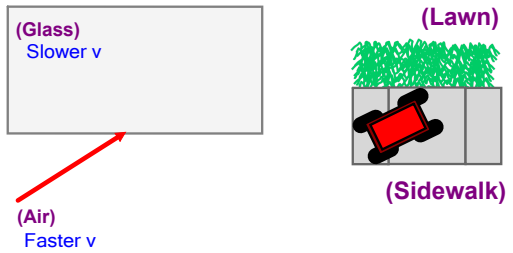
caused by a change in speed when it passes from one material to another



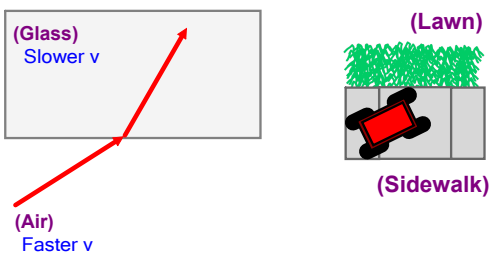
How light bends



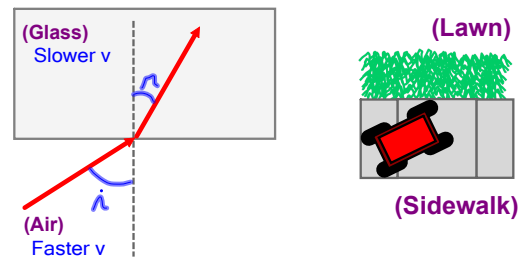
How light bends



How light bends



How light bends



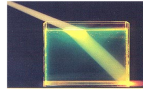
Refraction

Index of Refraction

The ratio of the speed of light in a vacuum to the speed of light in a given material is the material's index of refraction.

Index of Refraction (n)

$$n = \frac{c}{v_{\text{material}}}$$



Indicates how much the speed of light in the material is reduced

Index of Refraction

Velocity Values

n Values

Material	Speed of Light (m/s)	Material	Index of Refraction
Air/Vacuum	3.00×10^8	Air/Vacuum	1.00
Water	2.25×10^8	Water	1.33
Crown Glass	1.97×10^8	Crown Glass	1.52
Flint Glass	1.81×10^8	Flint Glass	1.66
Diamond	1.24×10^8	Diamond	2.42

slow velocity = high n

Snell's Law

ratio between index of refraction & respective angles

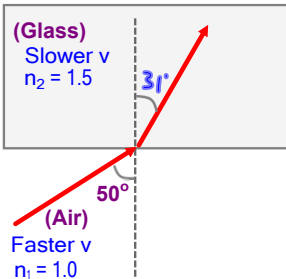
$$n_1 \sin \theta_1 = n_2 \sin \theta_2$$

$$(1.0) \sin 50 = (1.5) \sin \theta_2$$

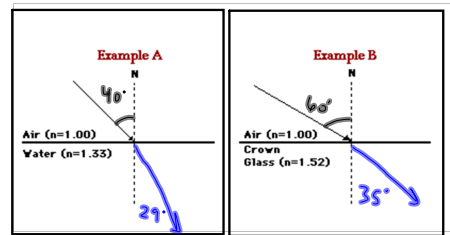
$$.51 = \sin \theta_2$$

$$\theta = 31^\circ$$

use inverse sin to get just θ

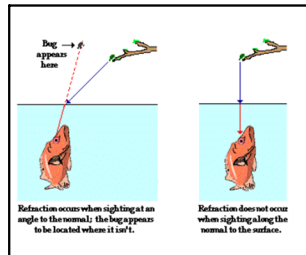
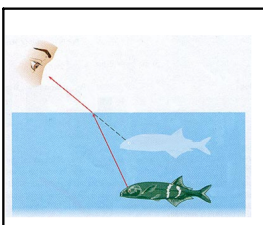


Snell's Law



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

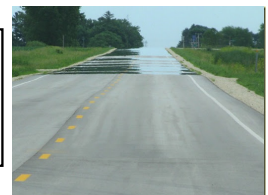
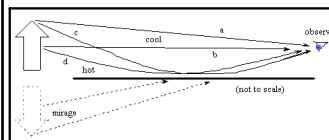
Refraction



Mirages

A **mirage** is an image of a distant object produced by the refraction of light through air layers of different densities

Mirages result when the air at ground level is much warmer or cooler than the air above it.

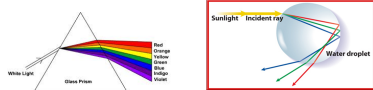


Refraction

Rainbows

Like prisms, rain droplets also refract light.

The refraction of the different wavelengths can cause white light from the Sun to separate into the individual colors of visible light.



Assignments . . .



- Begin Chapter 29 Homework #4 - 6

