CS 498 VR

Lecture 9 - 2/14/18

go.illinois.edu/VRlect9

Reviews from last lecture

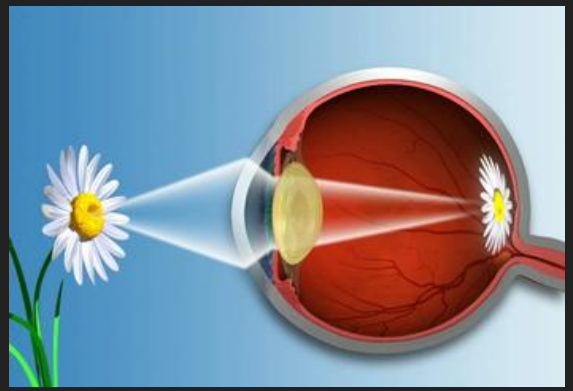
- What is Homogeneous Transformation Matrices ?
  - What information we can get out from this particular matrix ?

- What is Canonical Transformation ?
  - What is the purpose of using it?

Light and Optical Systems

Alternate World
Generator: proper lighting and shadows.

Lens: proper correction for the lens distortion.



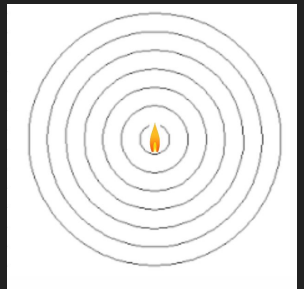
Light Models

Three light models

- Ray model:
- Wave mode:
- Particle model:

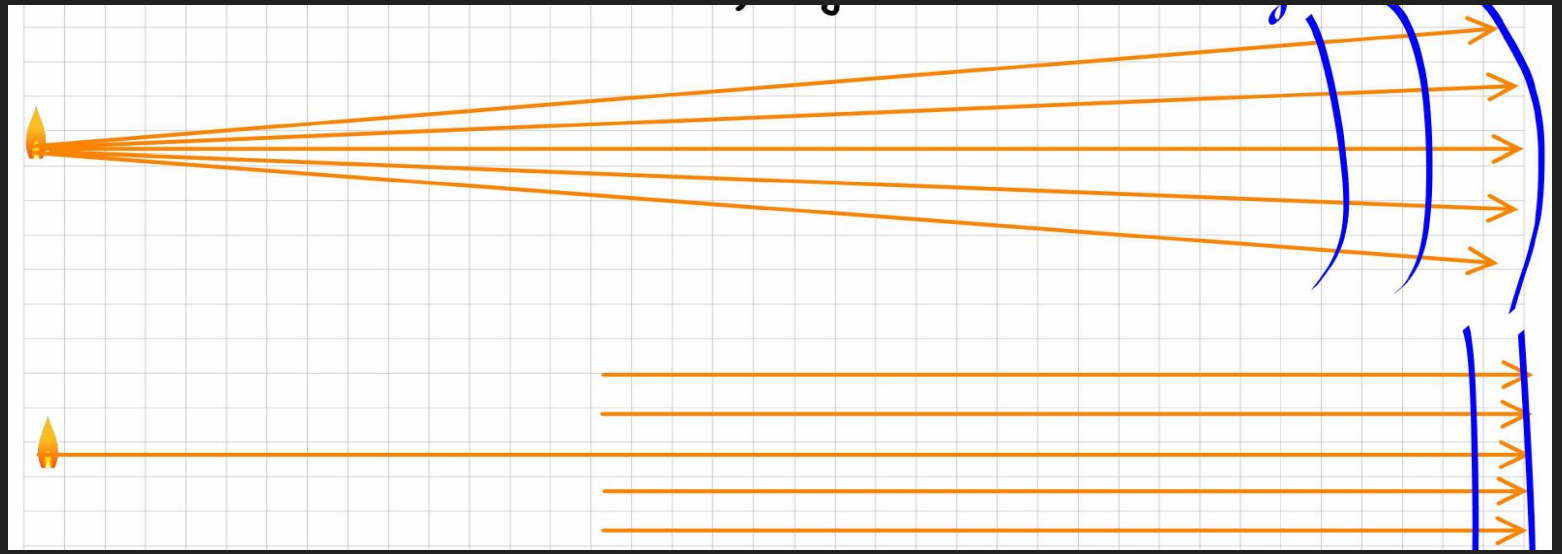
Advantages

Point source of light



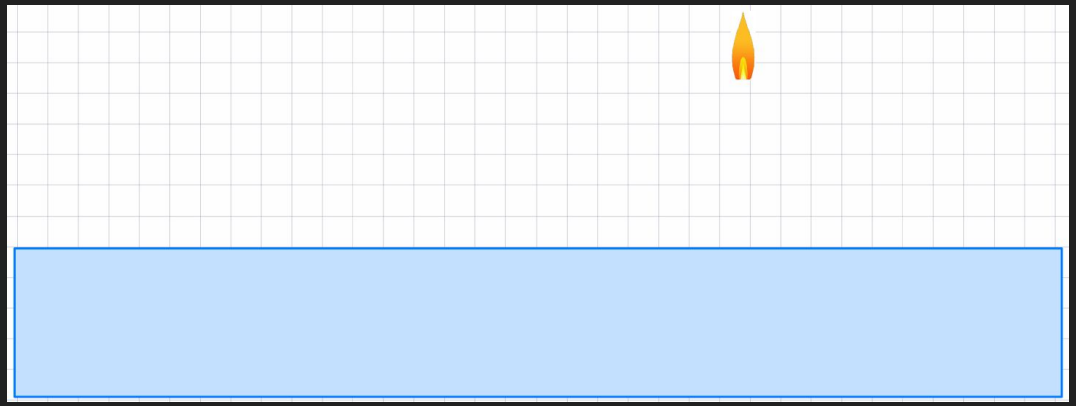
Light: Ray Propagation

Without mirrors or lenses, rays ALWAYS _____



Other names:

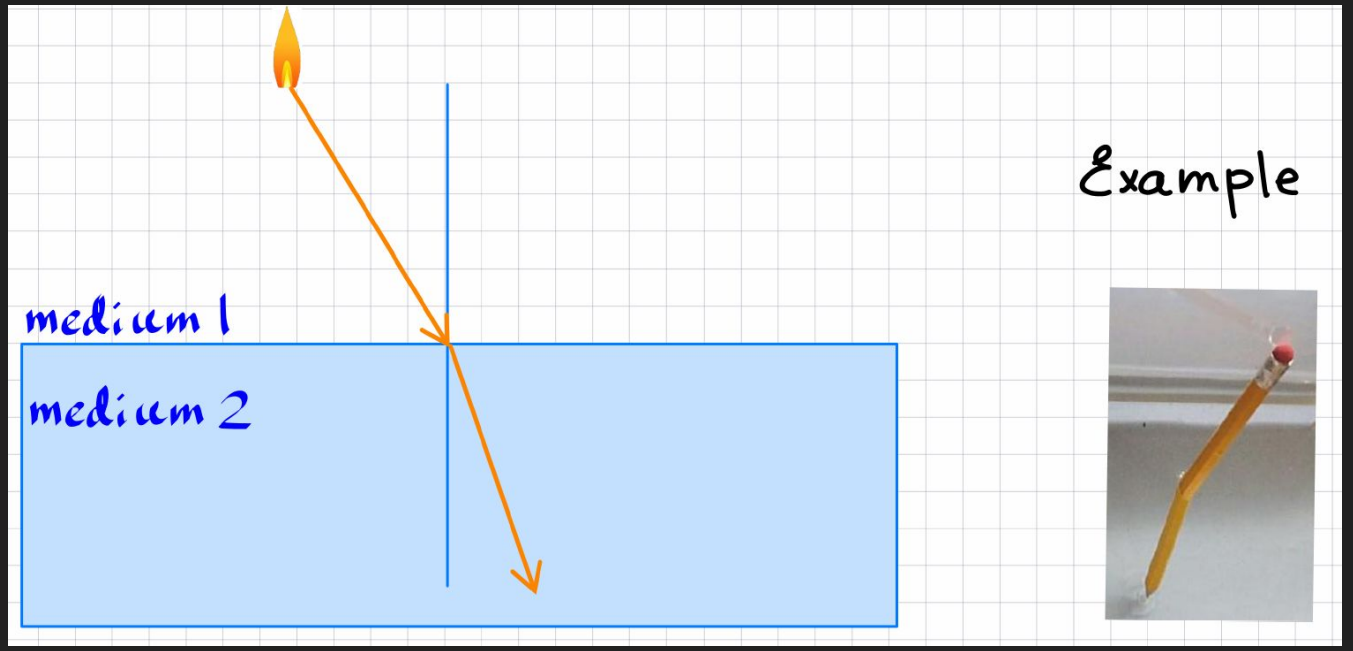
Light and Materials



We use materials to bend lights rays/waves

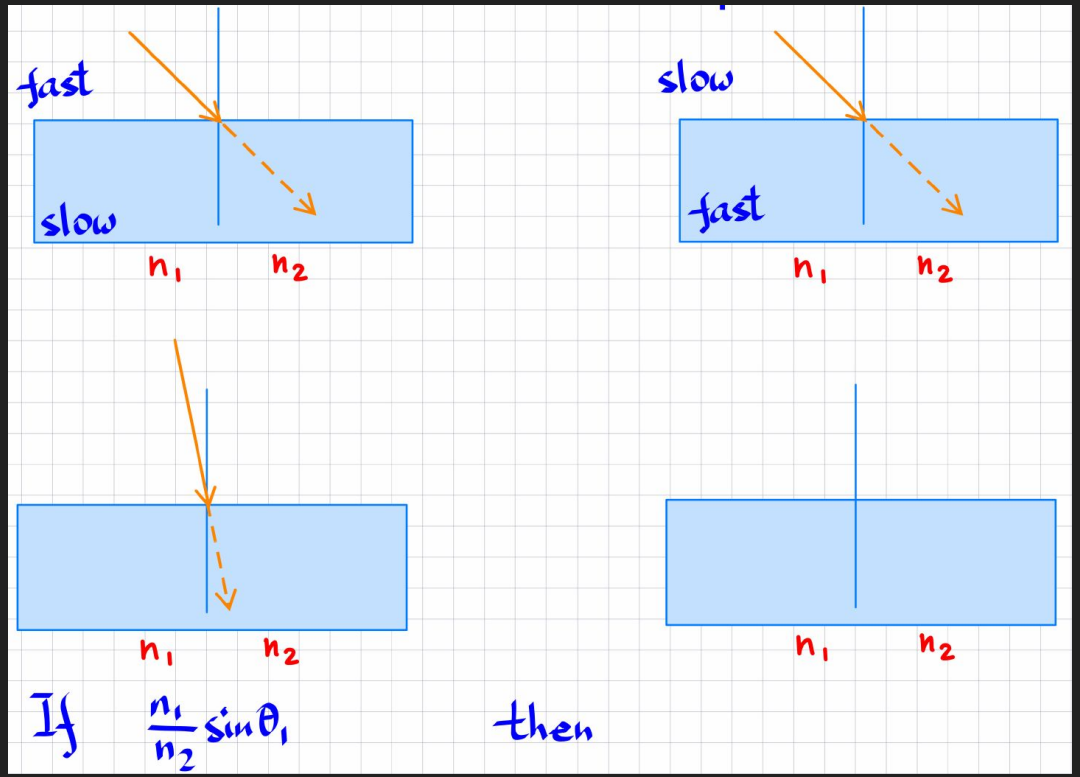
1.
2.
3.
4.

Light and Materials: Refraction

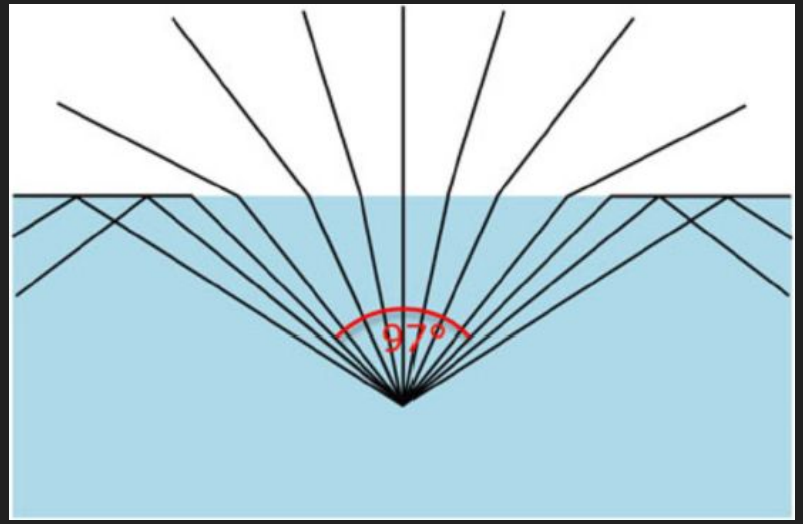


Snell's Law:

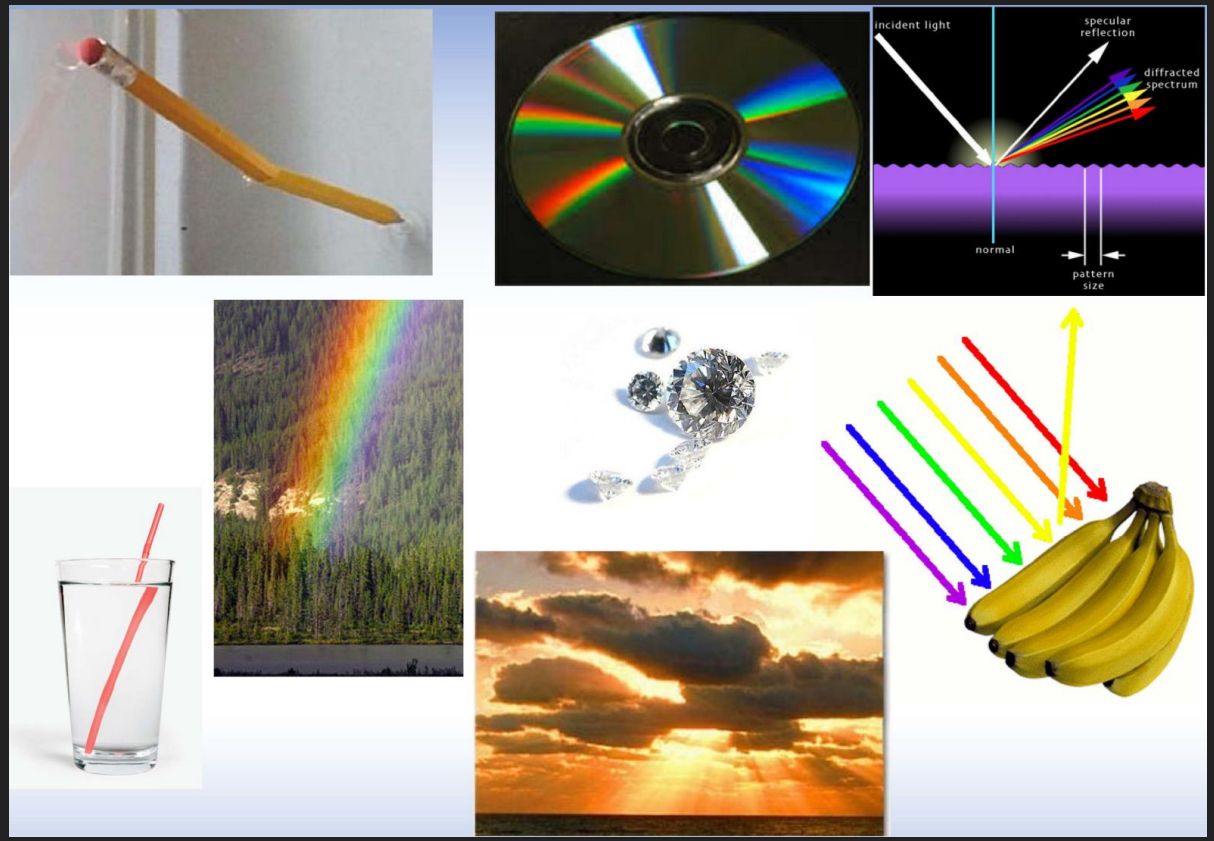
Refraction Examples



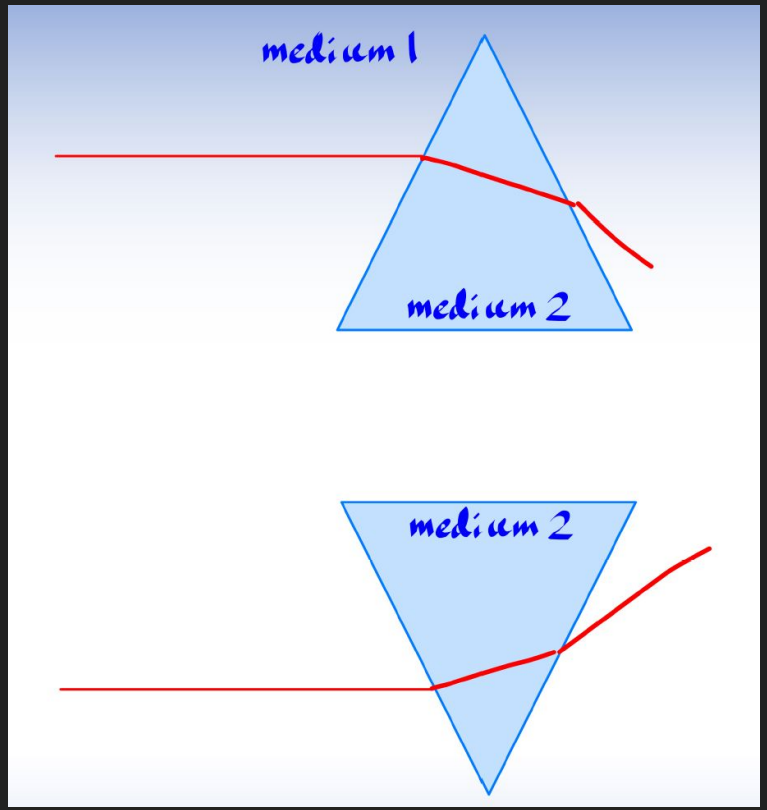
Examples



Refraction, Diffraction, Reflection, and Absorption

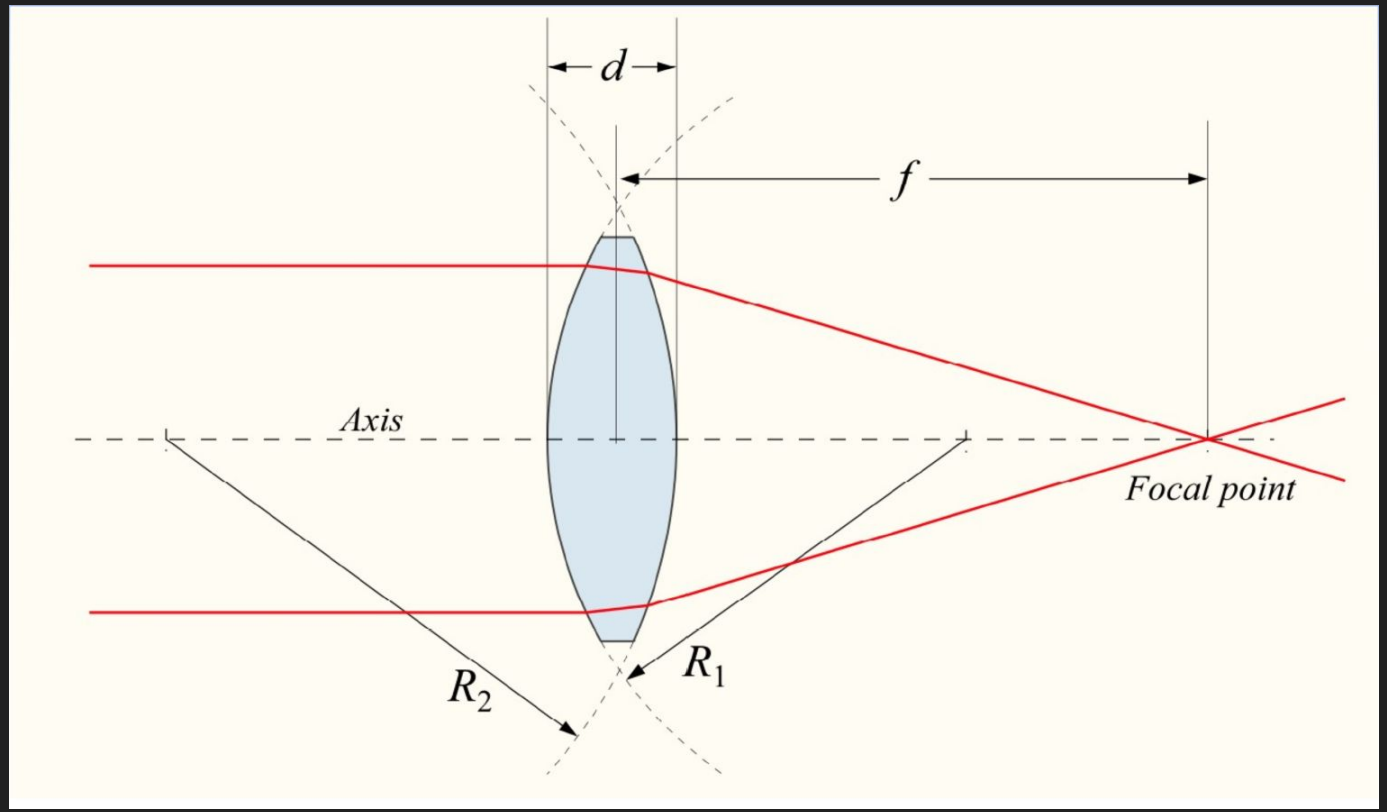


Refraction in a Prism

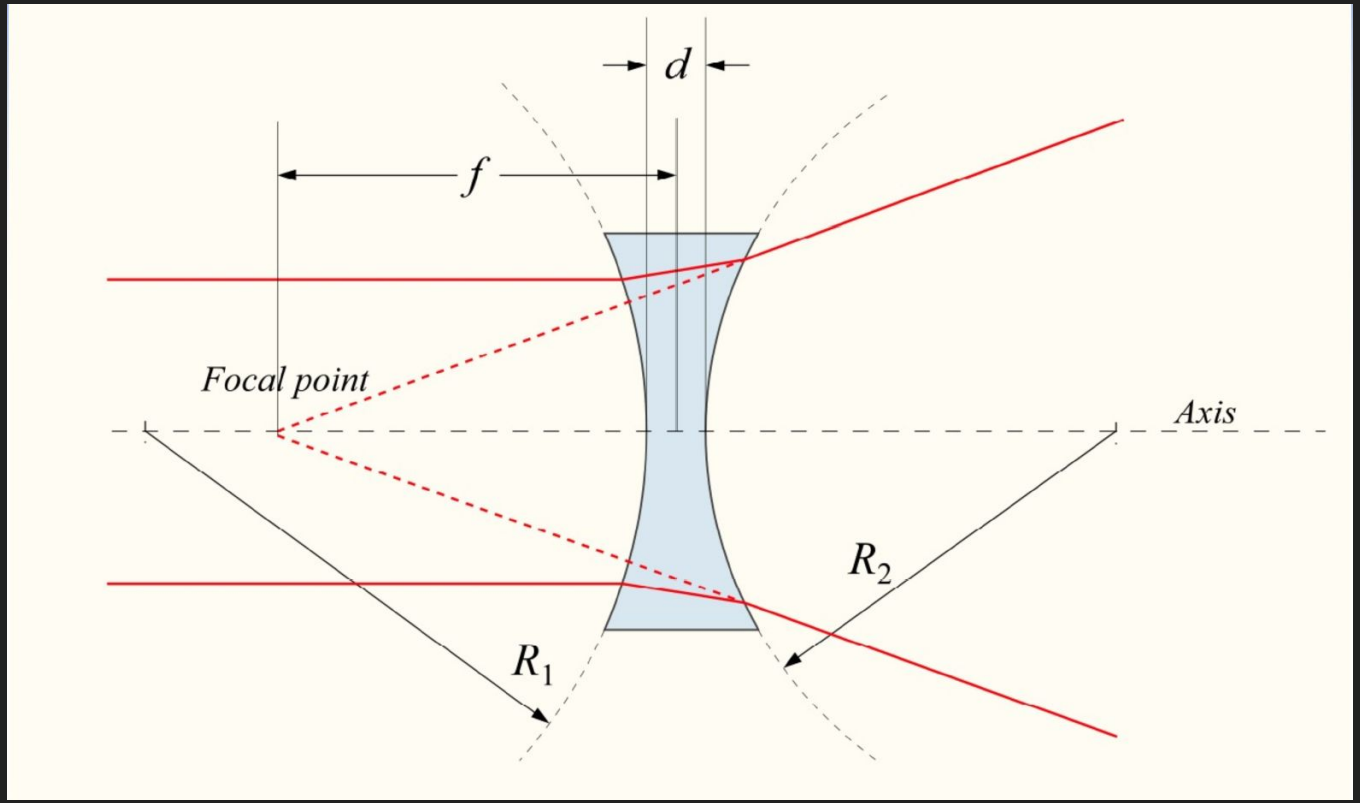


https://youtu.be/4zuB_dSJn1Y

The Lensmaker's Equation: Converging Lens

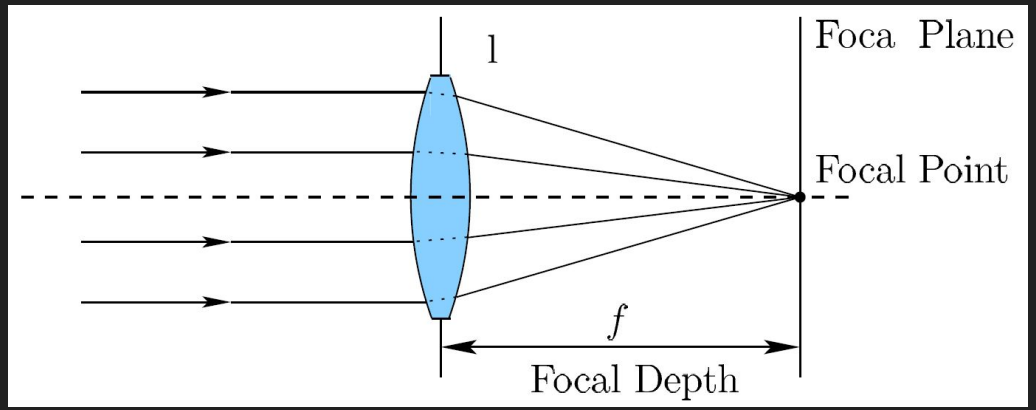


The Lensmaker's Equation: Diverging Lens



Convenient Unit: Diopter

Diopter is a converging (diverging) power of a lens.

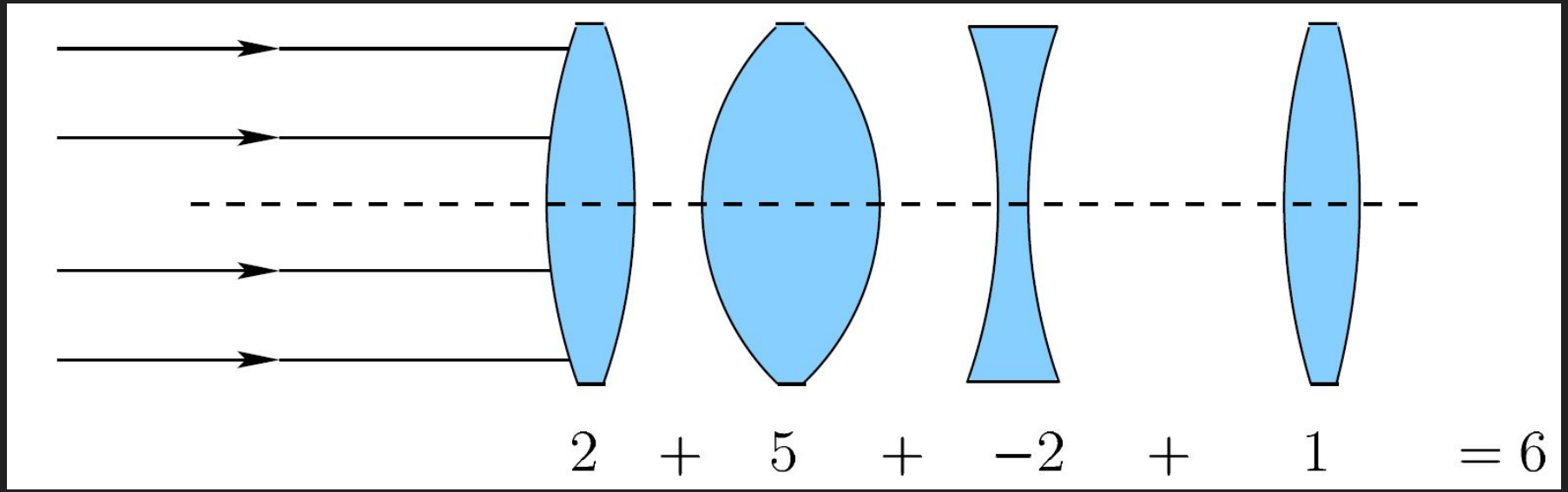


$D = 1 / f, \ (m^{-1})$

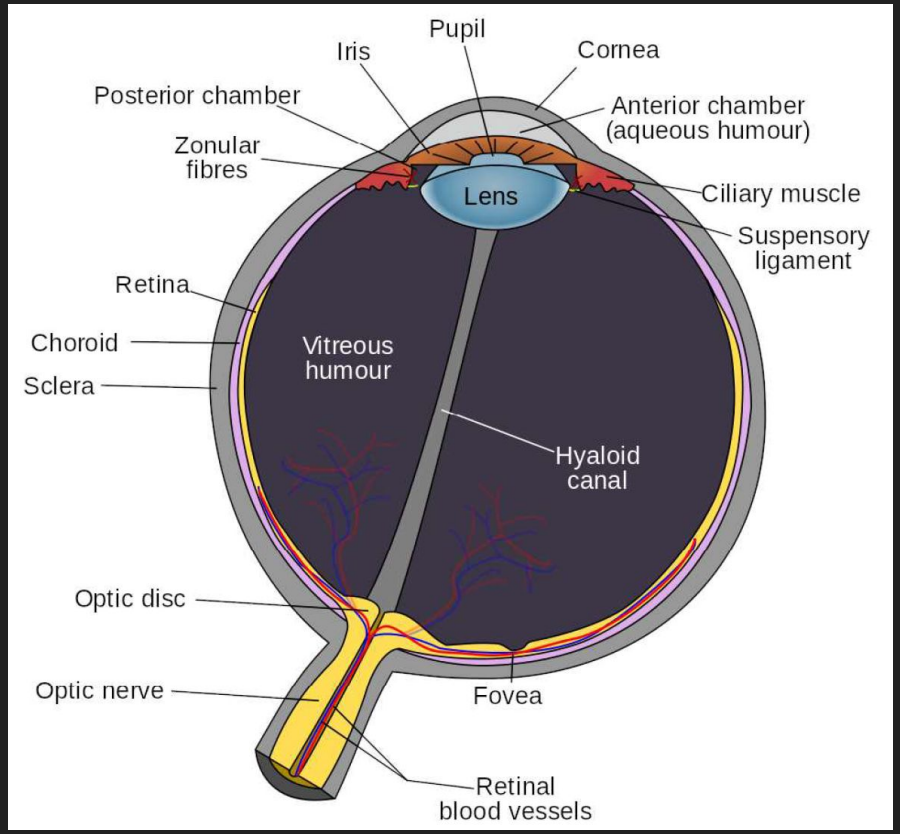
D =

Case 1: (1 / f) < 0
Case 2: (1 / f) = 0
Case 3: (1 / f) > 0

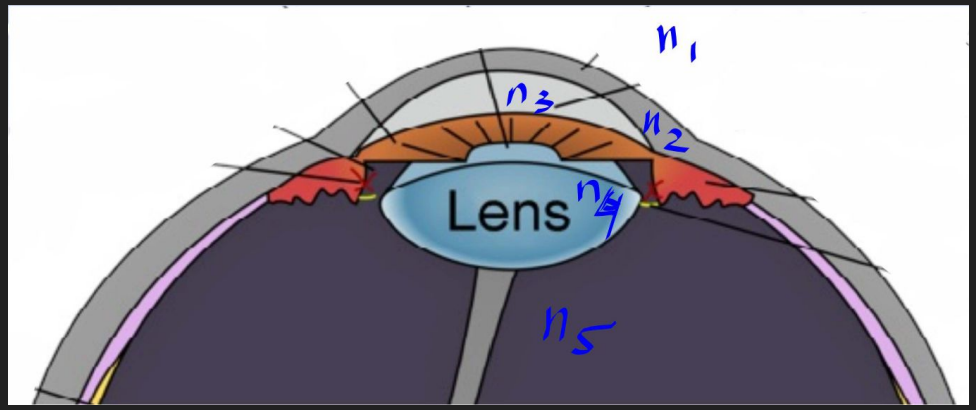
Combined Optical Power of a Chain of Lenses



Structure of the Human Eye



Optical Power the Human Eye



$n_1 \approx$

$n_2 \approx$

$n_3 \approx$

$n_4 \approx$

$n_5 \approx$

$D =$

Image Properties of a Lens

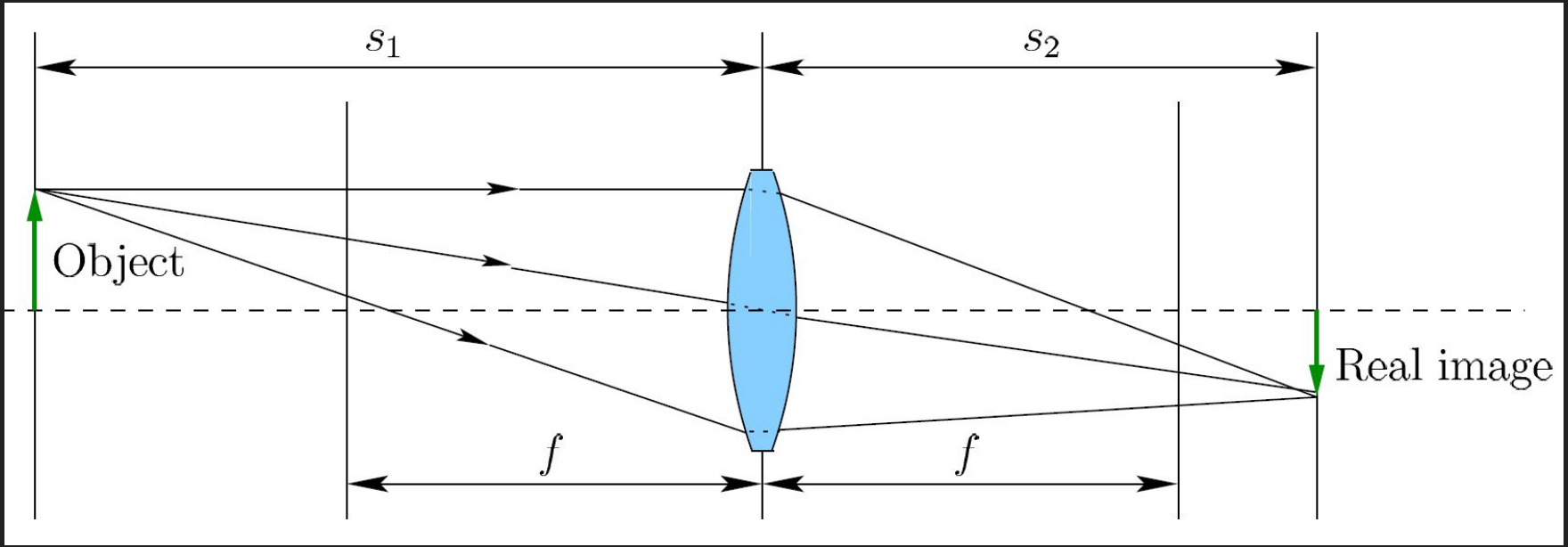
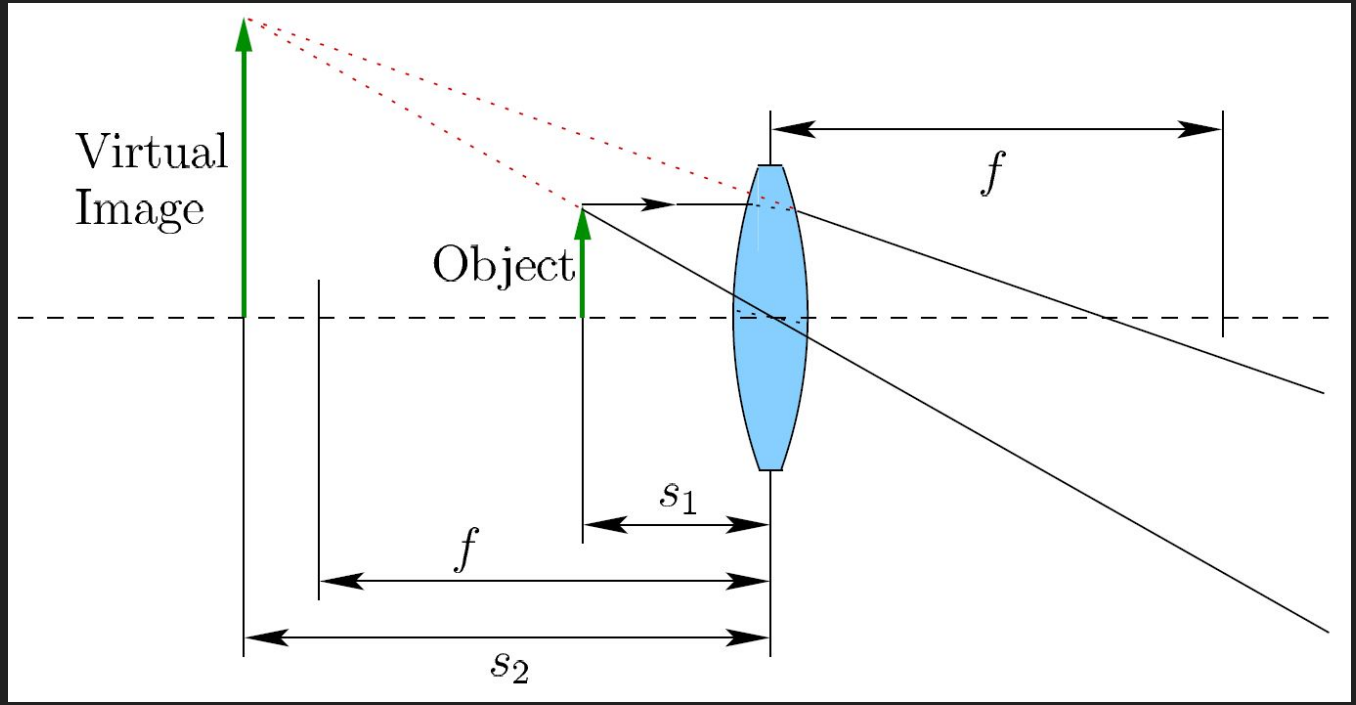


Image Properties of a Lens



Recap from today’s lecture

- What are the possible reactions when the light passes through different materials?
    - How do we calculate the refraction index from one material to another ?

- Which is the first part of the human eye that receives light rays?

Announcements

- MP 2.2-2.4 is due **next Monday (02/19)**
- Fill out the team formation survey RIGHT NOW if you haven't already done so. You can find sponsored project info at: go.illinois.edu/VRprojects

- Read Ch. 4 & 5.1