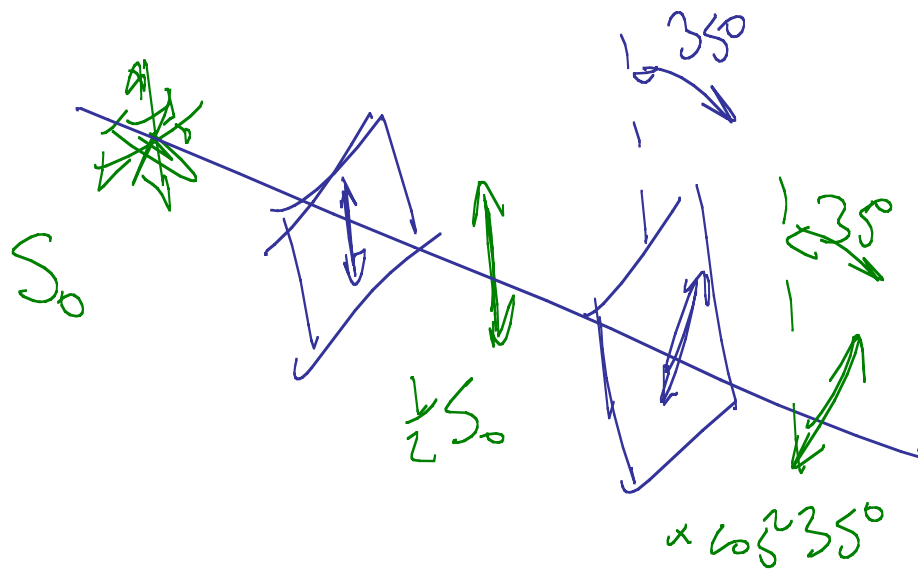


Phys 2120-4 11/12/12

Note Title

11/12/2012



29.42 Unpolarized light of intensity S_0 passes thru pol. with axis vertical then thru one w/ axis at 35° from vert. Intensity of outgoing beam

$$\Rightarrow S_{\text{out}} = S_0 \cdot \frac{1}{2} \cos^2 35^\circ$$

Chap 30

Reflection & Refraction

Tools \Rightarrow Optics

Visible Light

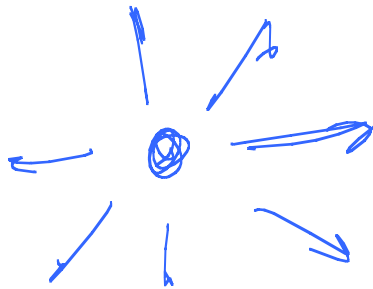
Concentrate on Vis range

$\lambda = 700 - 400 \text{ nm}$

Red - Blue

Optics

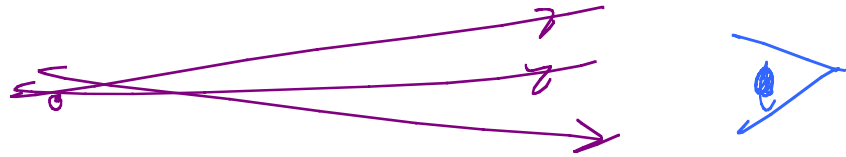
Geometrical Optics



Light \rightarrow rays.

Eye-brain system has role.

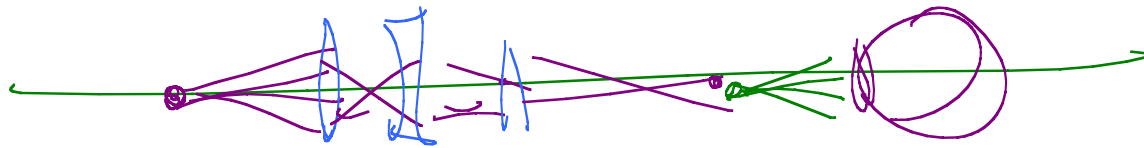
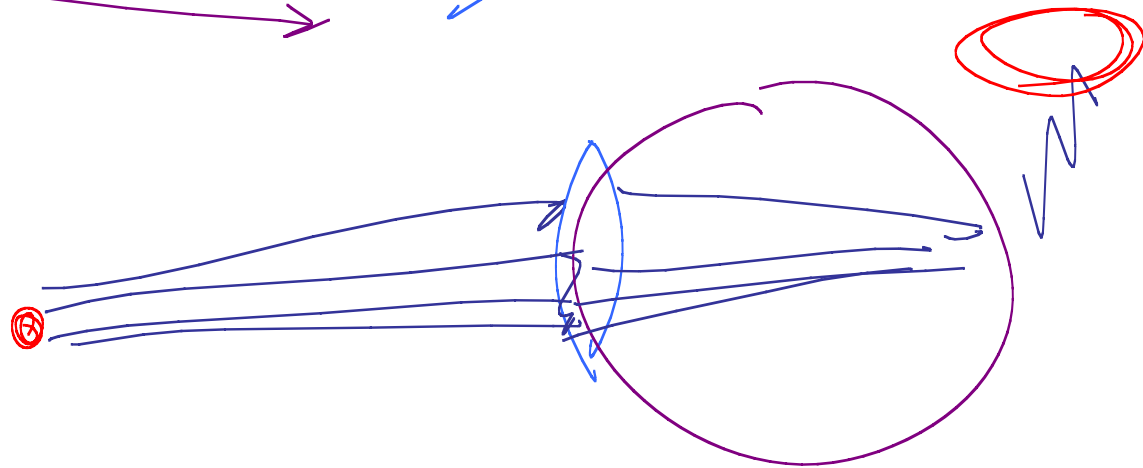
Eye



Eye/brain can

do size & distance

can be fooled



30 Basic rules for what rays do.

31 Uses these to discuss devices incl. mirrors lenses.

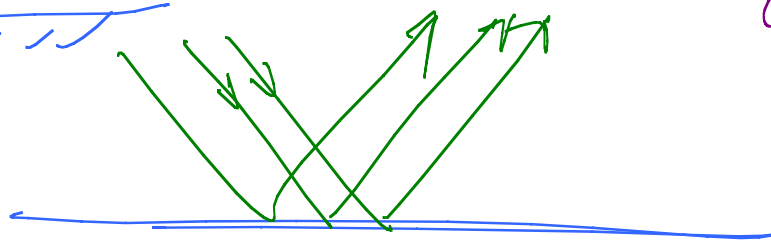
Reflection

Some metals, can be made very smooth,
then reflect ray. Flat surface:

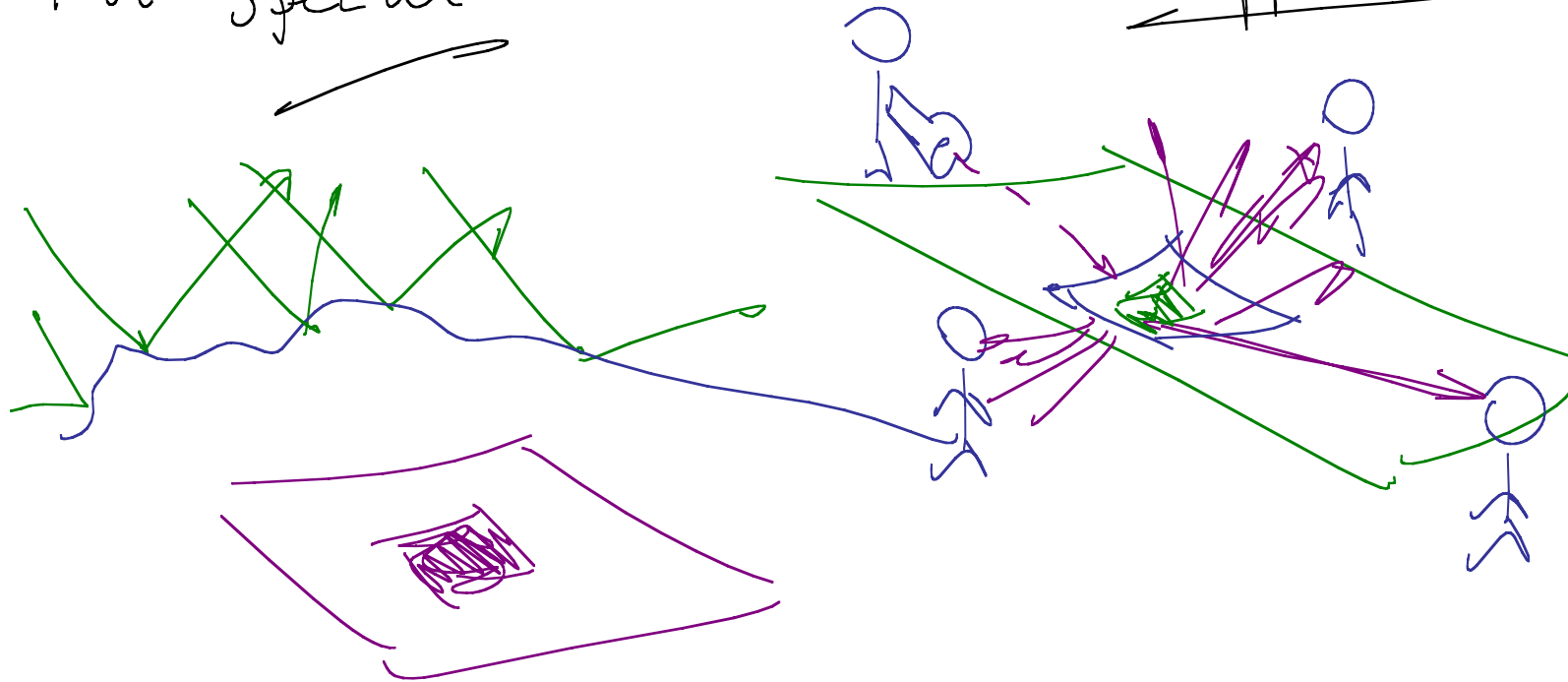


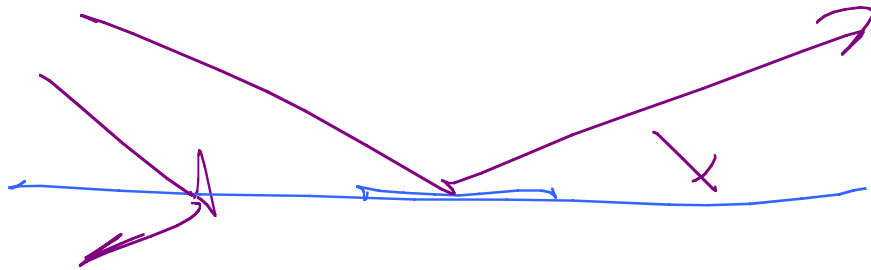
$$\theta_i = \theta_r$$

Equal
angles

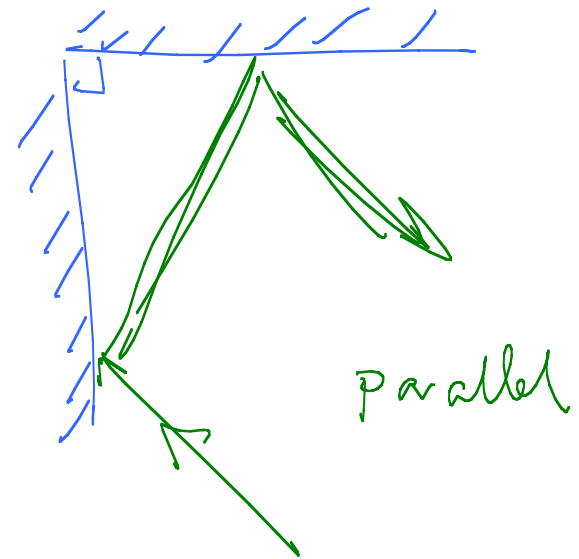


Actually reflection takes place all the time.
Not specular reflection. Diffusive reflection





Corner reflector



Refraction

Light waves in transparent medium

In medium
speed of light (v)
different:

$$v < c \quad v = \frac{c}{n}$$

$$n > 1$$

Index of refraction

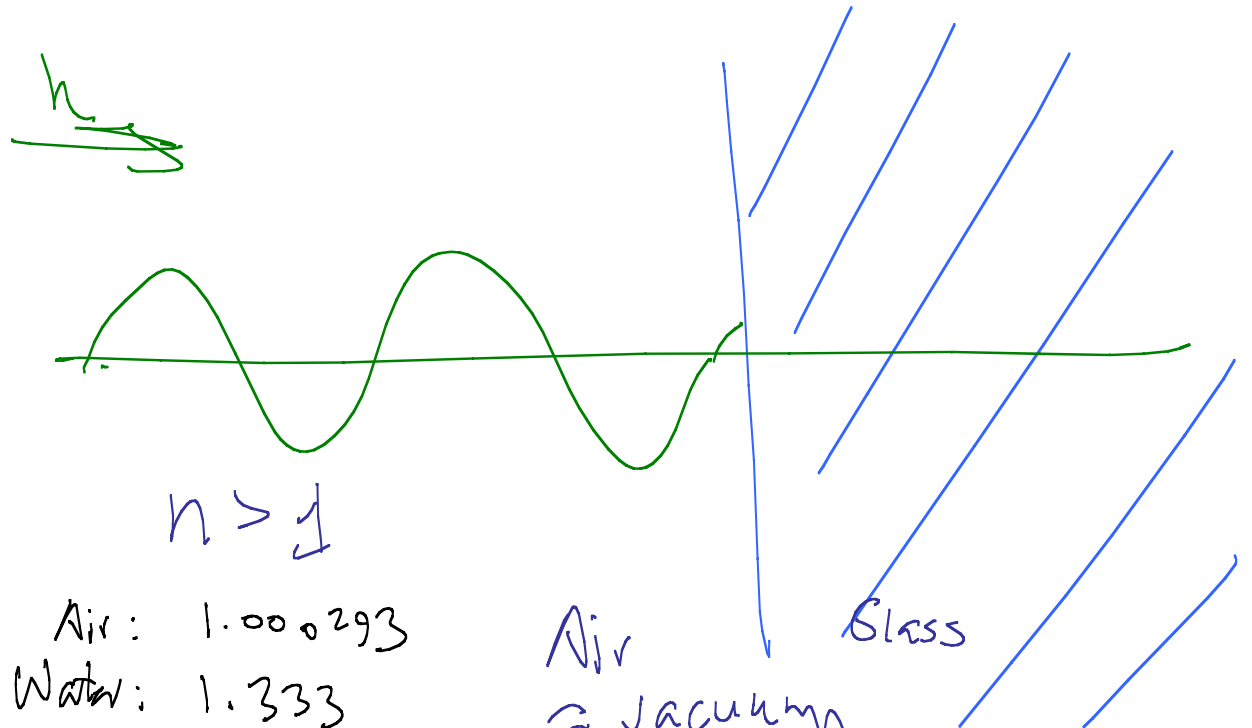
Air: 1.000293
Water: 1.333
Glass: 1.5 - 1.9

Air
 \approx vacuum

Polysty: 1.49

Glass

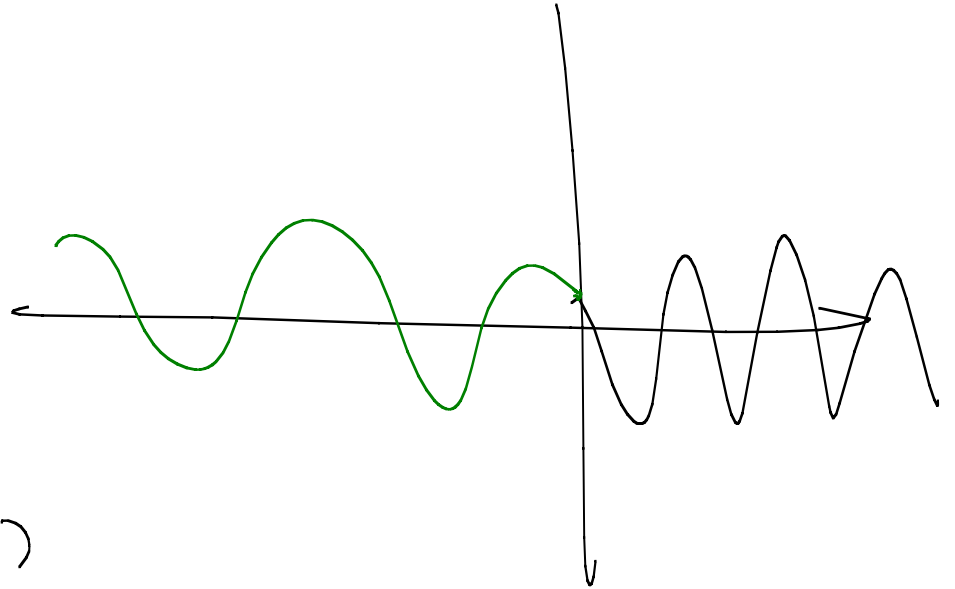
P 524

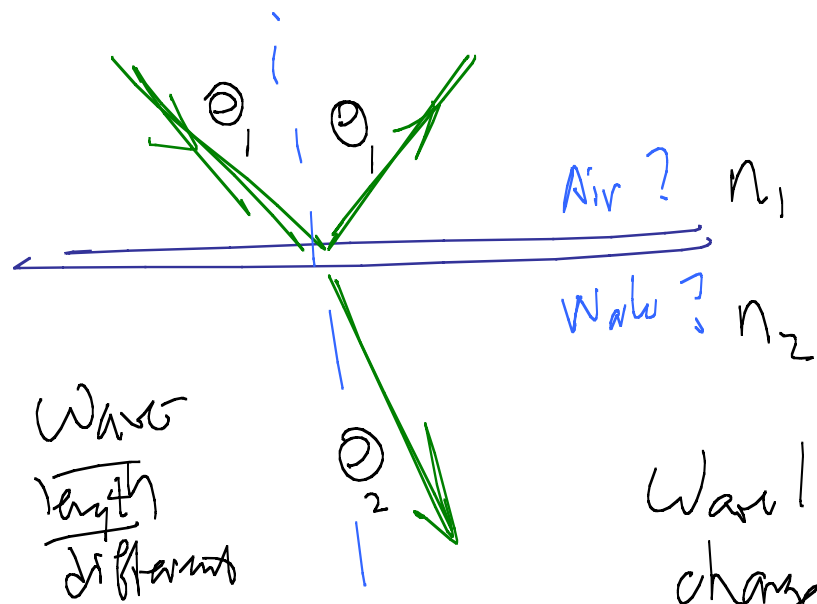


$\lambda, f?$ $\lambda f = v$ inside medm

f is same, λ different,
smaller

What if it wave hits
interface at angle?



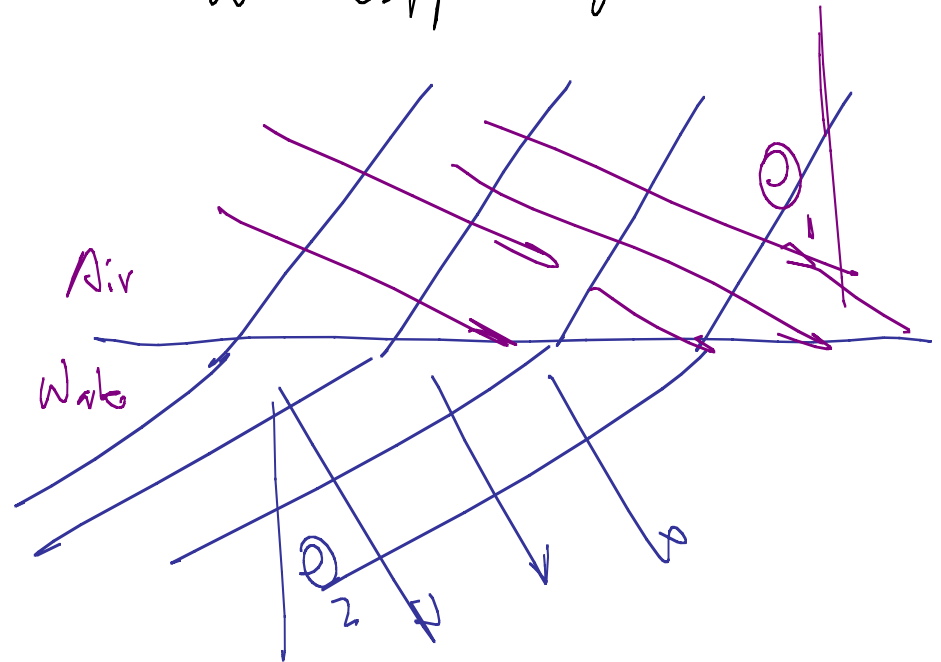


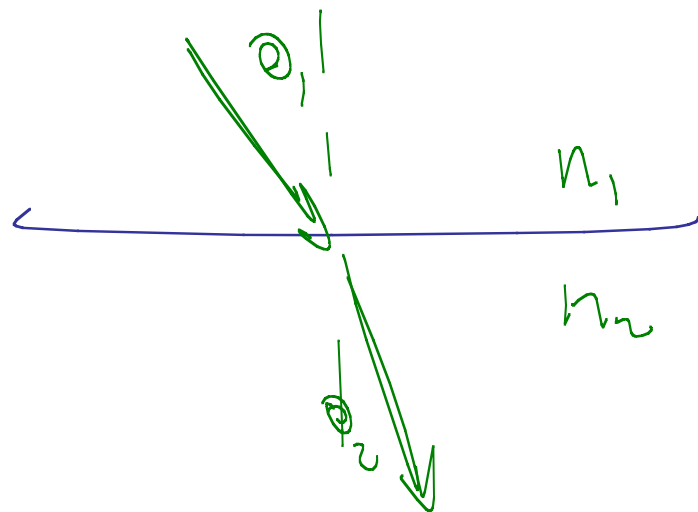
Concentrated at
part into med-
Refraction.

Wave length
changes
(shorter in water)
p. 534

Some reflects.

Some passes into medium
at diff. angle.





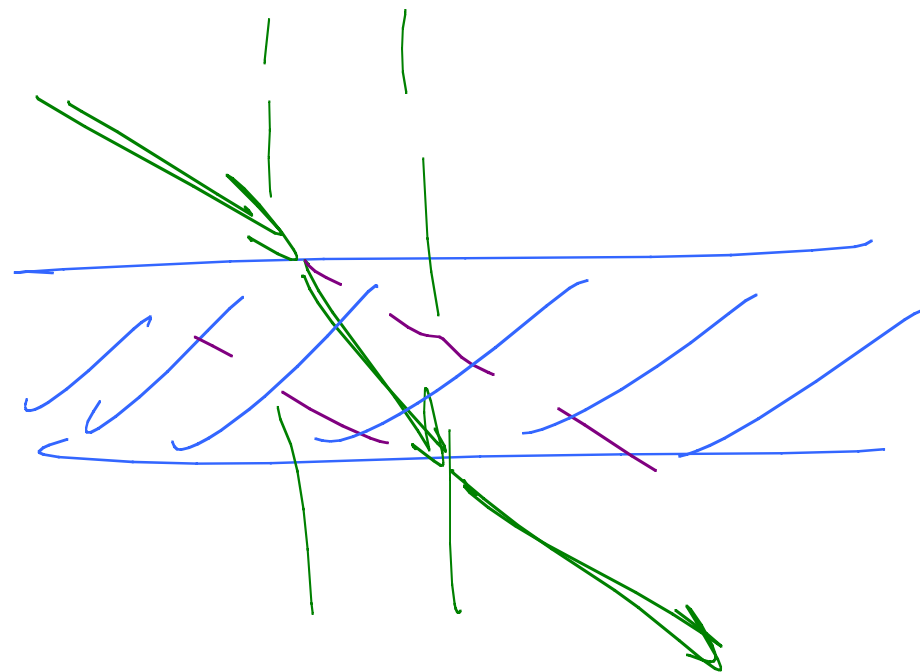
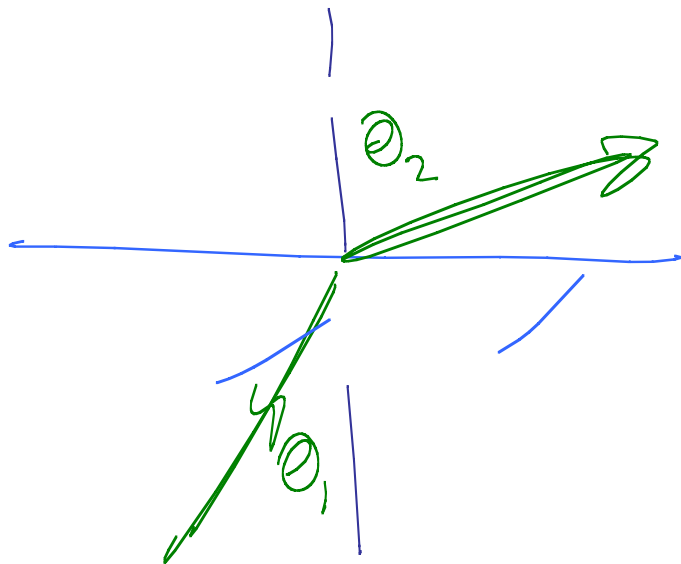
Could derive relation connecting
 θ_1, θ_2 , etc.

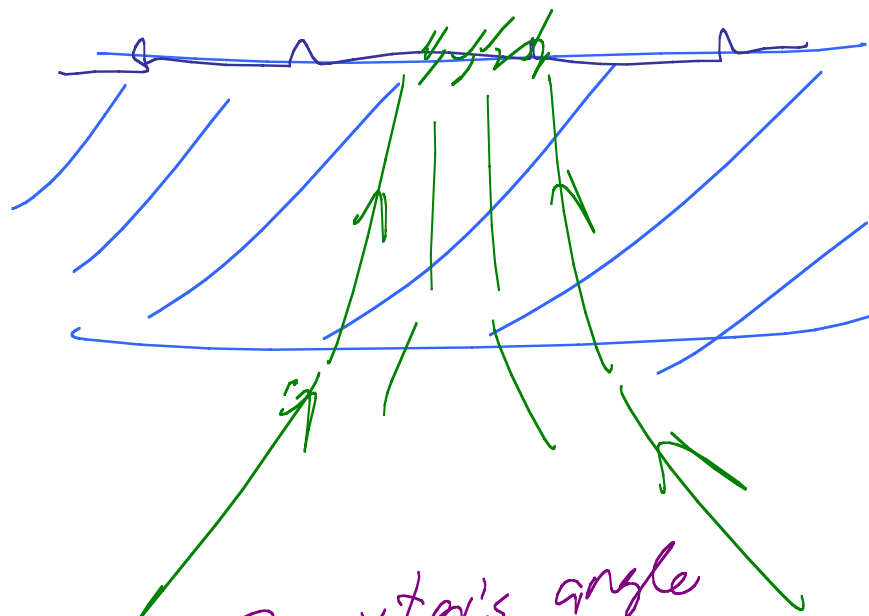
$$n_1 \sin \theta_1 = n_2 \sin \theta_2$$

Snell's Law.

Examples - later

Slab w/ parallel faces





Brewster's angle

$$\tan \theta_p = \frac{n_2}{n_1}$$

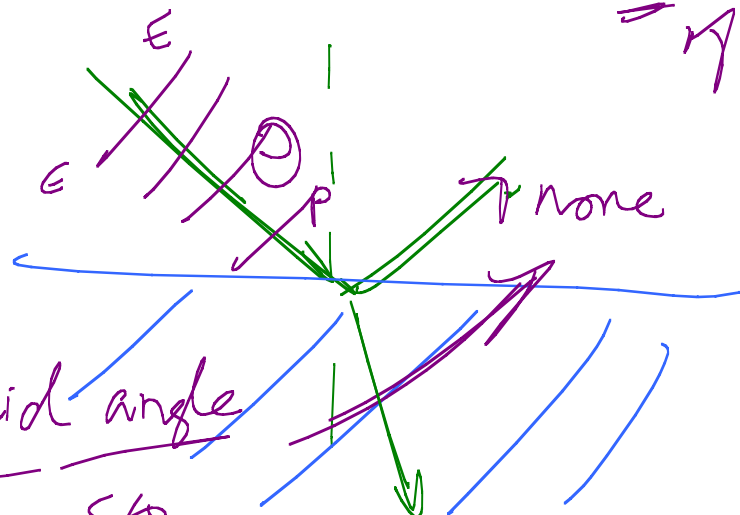
Air glass

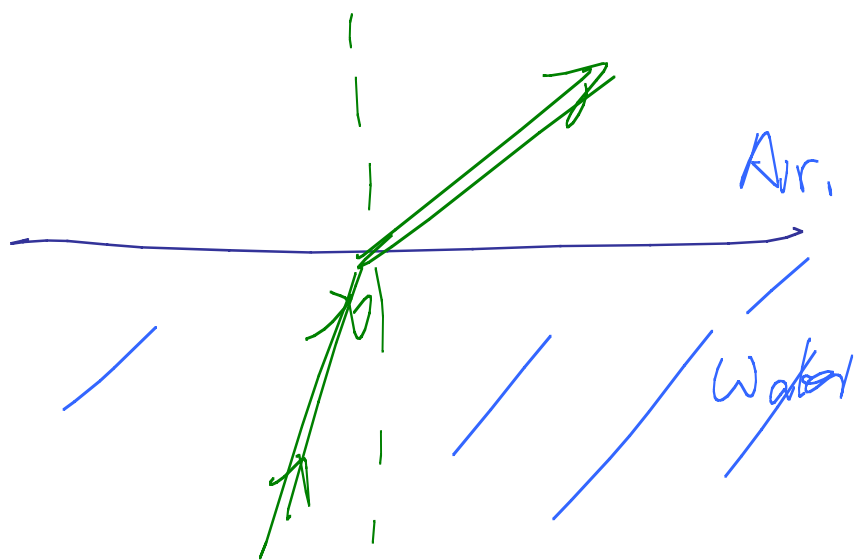
Special angle
 $\theta_p \sim 56^\circ$

CD player

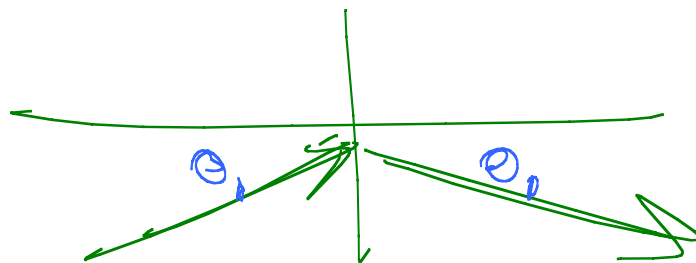
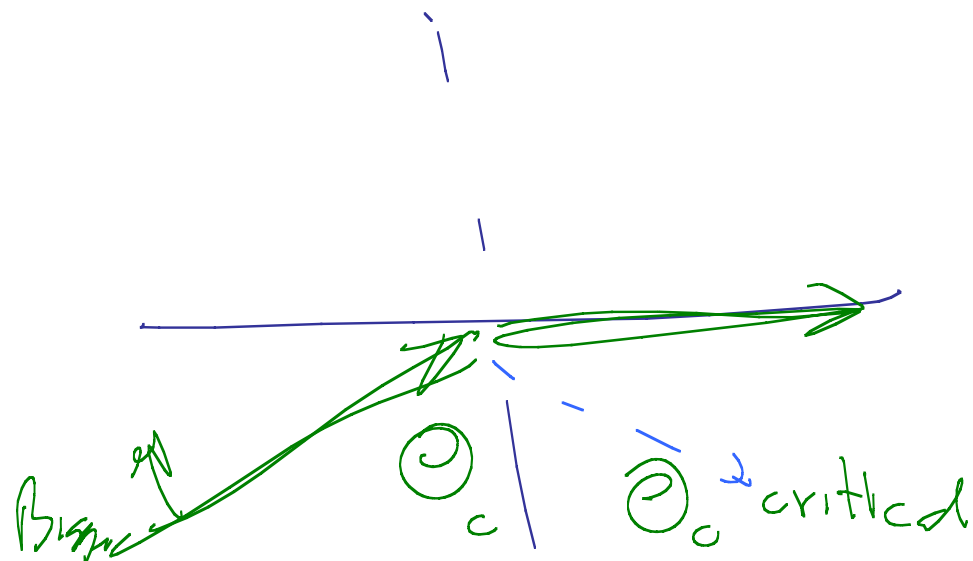
Another topic:

\vec{E} pol'd
 in plane
 \vec{r} page





Go beyond critical angle



All reflected