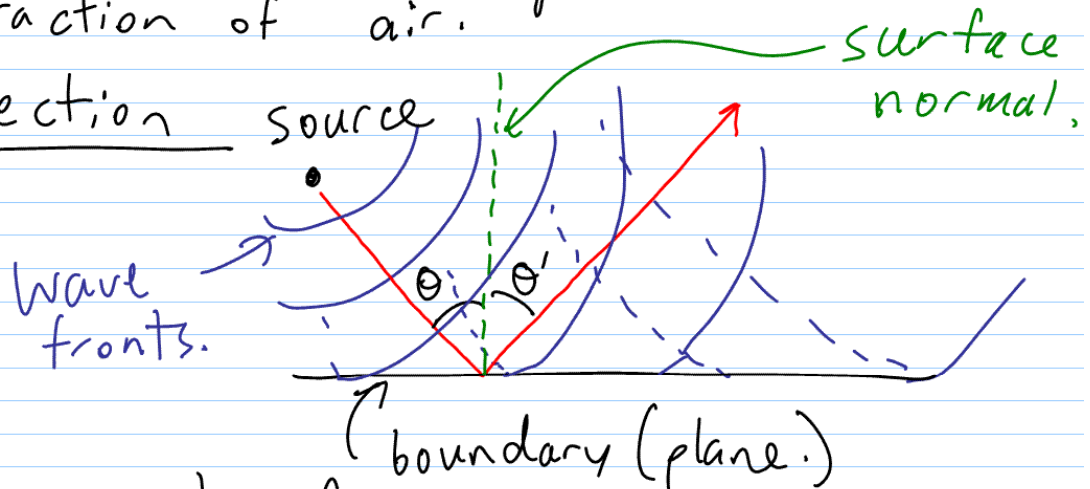


Rays in a uniform medium travel in straight lines.
- If n varies in a medium, rays can bend. (mirages occur when temp. gradient changes index of refraction of air.)

Reflection



θ = angle of incidence.

θ' = angle of reflection

law of reflection.

Diffuse Reflection: for a bundle of rays, it appears that law of

reflection is not obeyed.

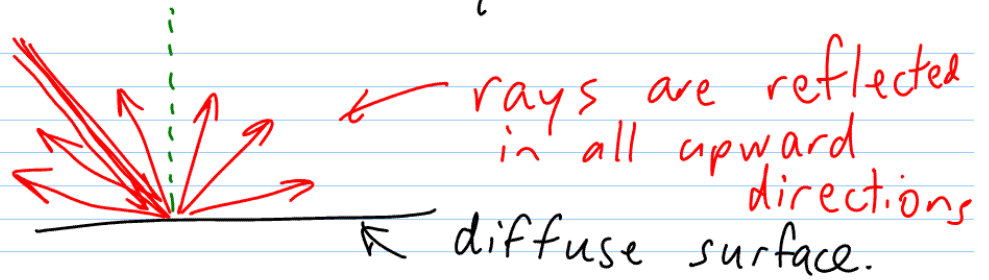


Image Formation

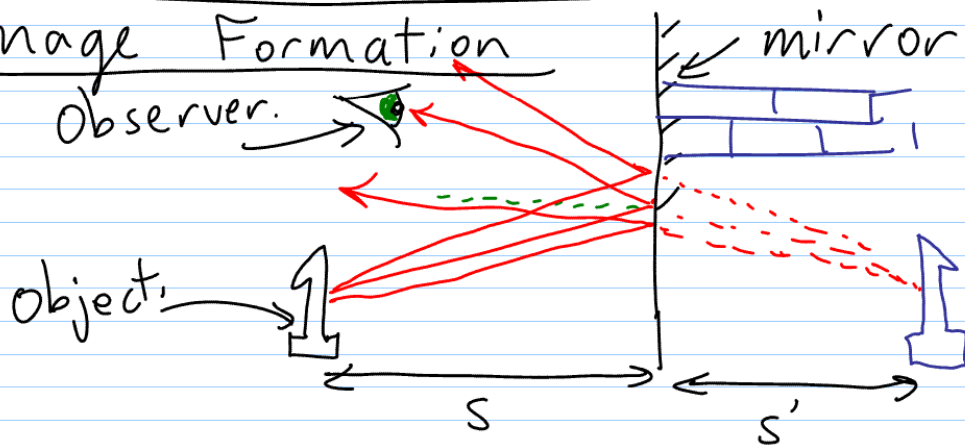
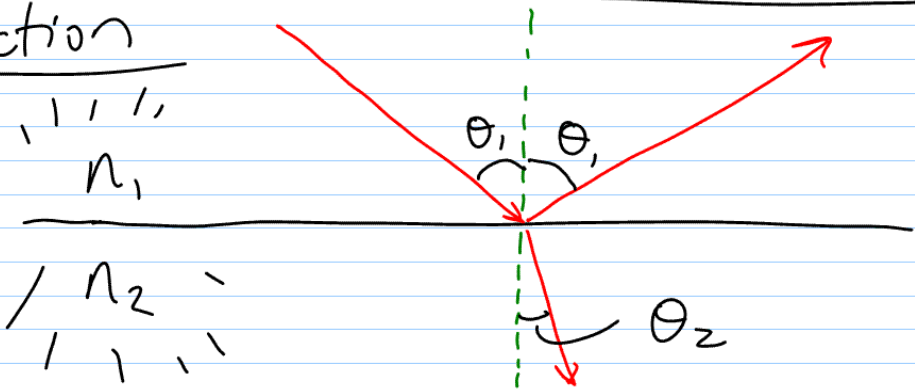


Image distance in a plane mirror:

$$s = s'$$

- image is where rays appear to emerge from.
- no rays actually pass through this image, so it is called "virtual".
- image is reversed front-to-back (along a line normal to mirror).

Refraction



Snell's Law: $n_1 \sin \theta_1 = n_2 \sin \theta_2$

Note: if $\frac{n_1}{n_2} < 1$, this always exists.

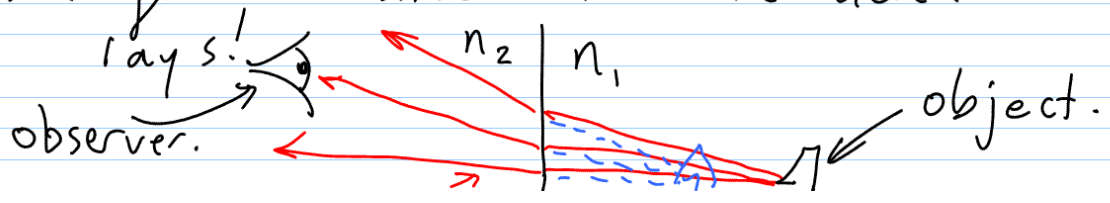
if $\frac{n_1}{n_2} > 1$, then there may be no solution!!

(you will try to take \sin^{-1} of a # > 1 ... error)

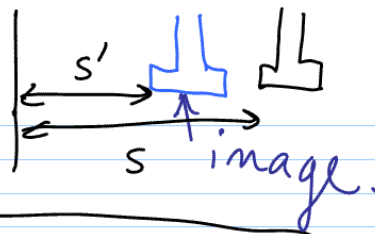
→ no refracted ray!

→ 100% of energy is reflected.

Image Formation from refracted rays!



rays bend at surface.



plane surfaces in which n changes abruptly.

$$s' = \frac{n_2}{n_1} s$$