My name is Mike Gentile.
(you can call me "Mike")
mgentile@physics.rutgers.edu

Welcome!

Physics 194 - Lecture 18

Have a question during class? Please ask it right away, even if it means interrupting in the middle of a thought. I want you to!

Agenda

- Diverging (convex) mirrors
- Refraction
- Total internal reflection
- Intro. to lenses (time permitting)

Class starts @2:15 pm

Shaving/makeup mirror

Object is further from the mirror than the focal point F is.

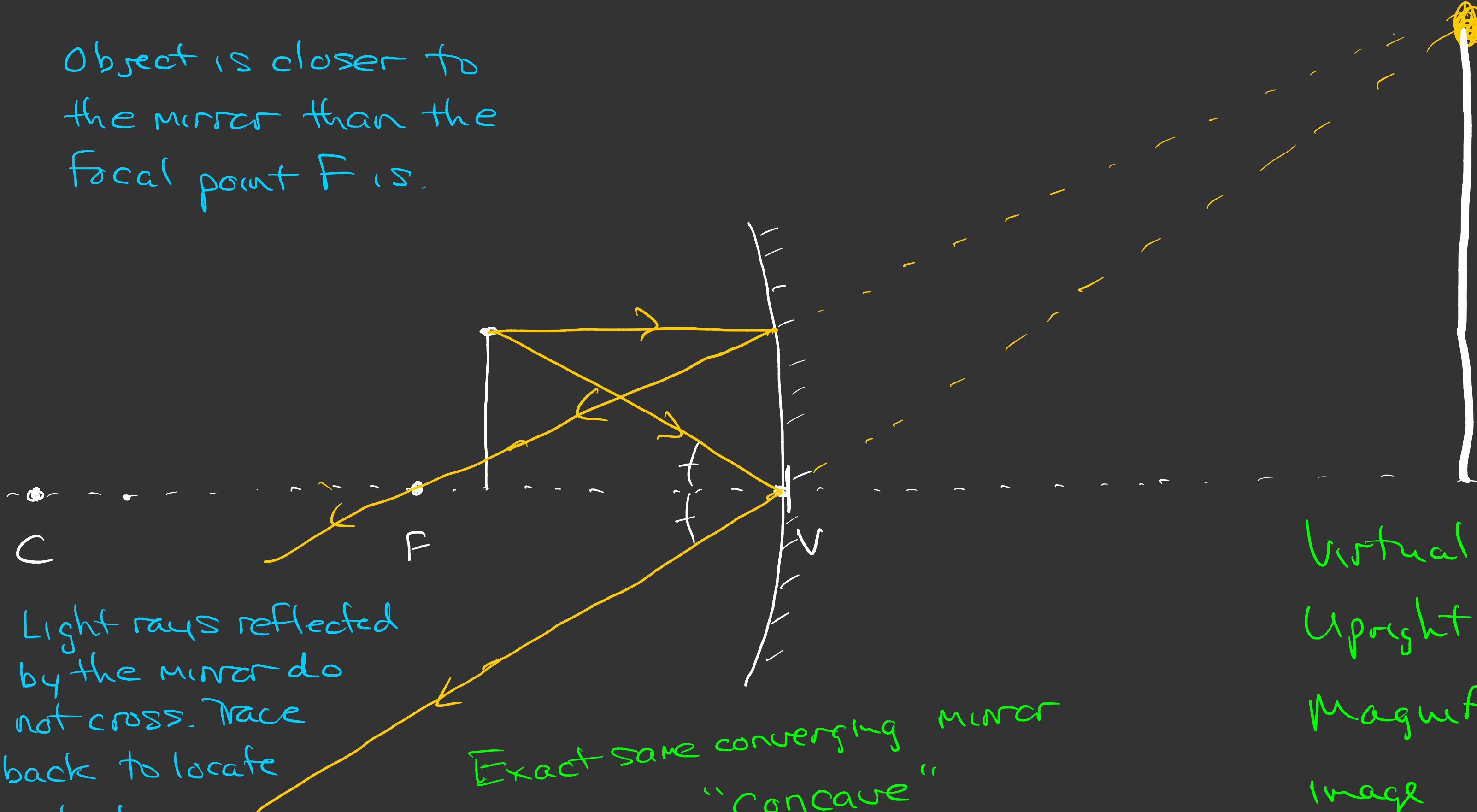
Real
Inverted
magnified
(a little)
image.

image of the top of the person's head.

Light rays reflected by the mirror do cross and continue, a real image.

Converging mirror
"concave"

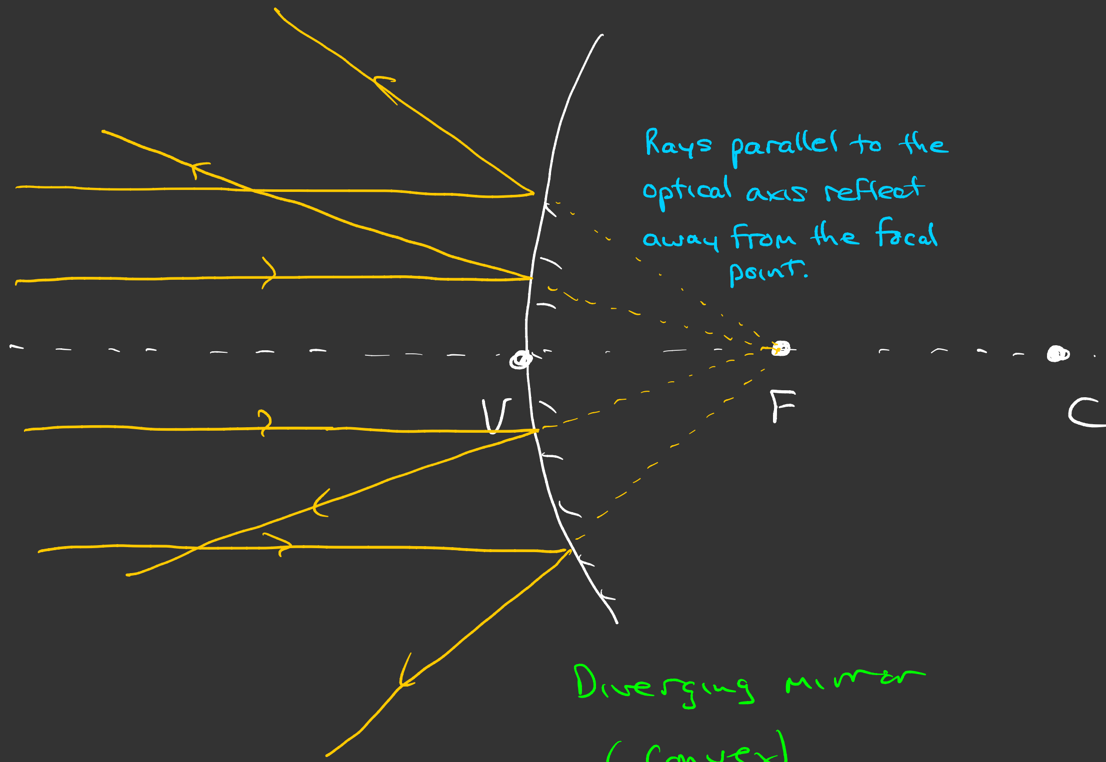
Object is closer to the mirror than the focal point F is.



Light rays reflected by the mirror do not cross. Trace back to locate virtual image.

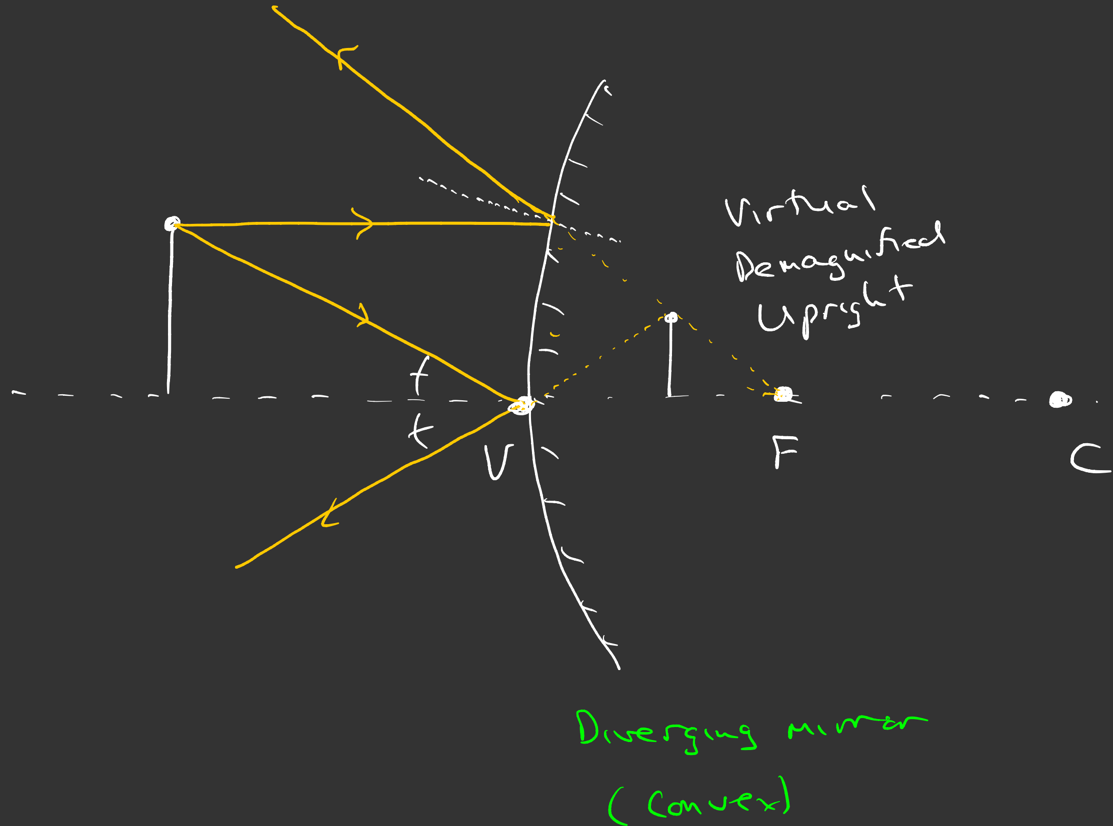
Exact same converging mirror "Concave"

Virtual
Upright
Magnified
image



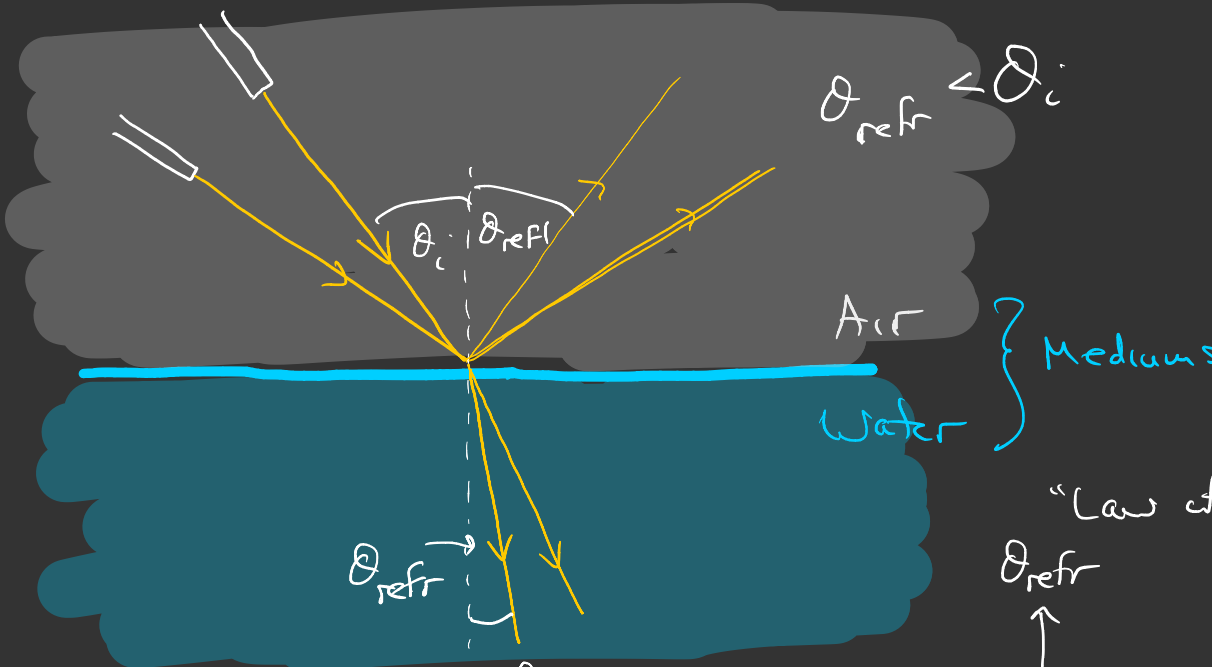
Diverging mirror

(Convex)



Virtual
Demagnified
Upright
V
F
C
Diverging mirror
(convex)

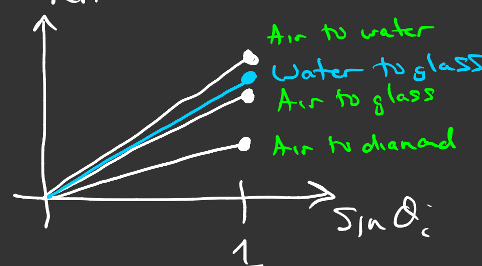
Refraction: Light interacting with transparent objects.



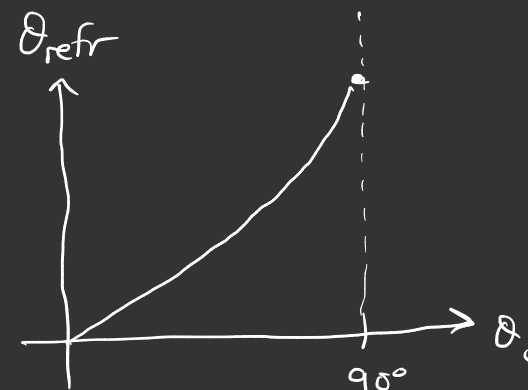
Law of reflection
(Snell's law)

$$n_i \sin\theta_i = n_{refr} \sin\theta_{refr}$$

↑ index of refraction ↑ index of refraction

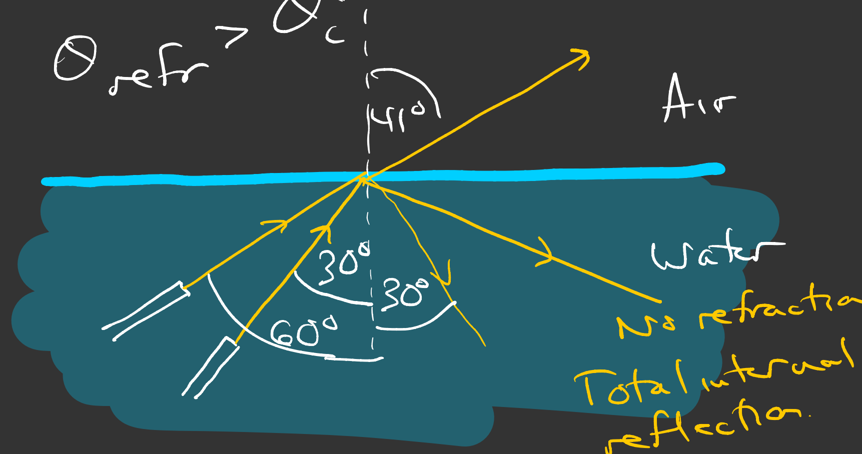


"Law of refraction"



n	material
1	Vacuum
1.003	Air
1.33	Water
1.5	Glass
2.4	Diamond.

$\theta_{refr} > \theta_c$



GT: Determine the refraction angle and add the refracted light ray to the diagram.

$$n_i \sin\theta_i = n_{refr} \sin\theta_{refr}$$

water! 30° air! ???

$$\theta_{refr} =$$

$$\sin\theta_{refr} = \frac{n_i}{n_{refr}} \sin\theta_i = \frac{1.33}{1} \times (0.5)$$

GT: Same thing but $\theta_i = 60°$

$$\sin\theta_{refr} = \frac{1.33}{1} \times \sin 60°$$

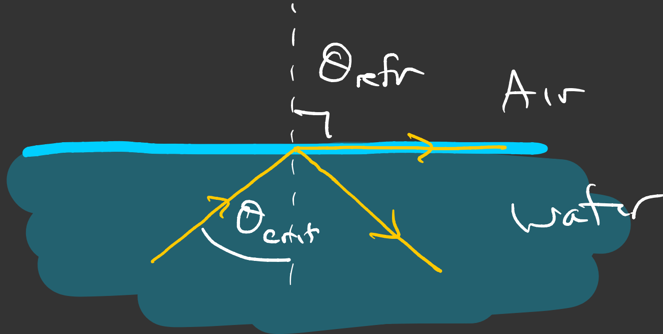
$$\theta_{refr} =$$

TIR

To happen...

1) Light is traveling in a higher n material, attempting to refract into a lower n material.

2) The incident angle must be ≥ some critical angle.



$$n_i \sin\theta_{crit} = n_{refr} \underbrace{\sin 90°}_{1}$$

$$\Rightarrow \sin\theta_{crit} = \frac{n_{refr}}{n_i}$$

$$\theta_{crit} = \sin^{-1}\left(\frac{n_{refr}}{n_i}\right)$$

1

1.33