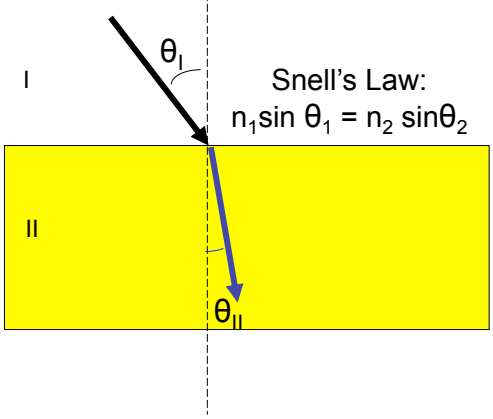
If an EM wave (light) travels from air into glass, the frequency will not change.
(Why not?) What DOES change?

A) speed B) wavelength (λ)

C) <u>both</u> speed and λ

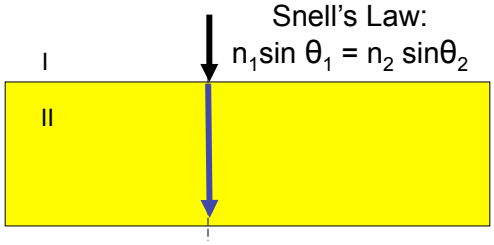
D) <u>Neither</u> speed nor λ

For all waves
f λ = speed
= c/n (for light)

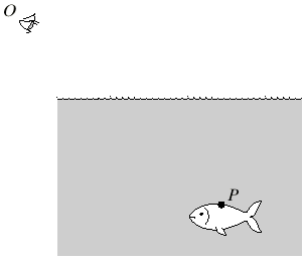


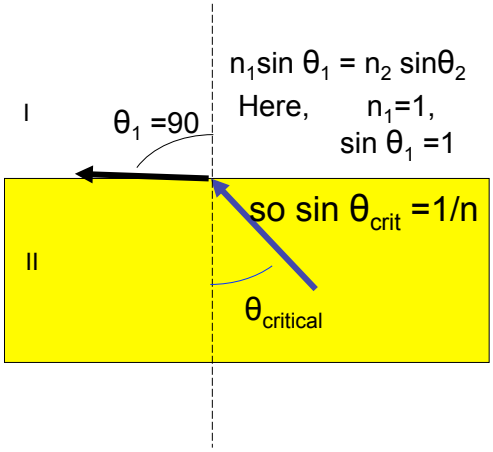
Snell's Law:
$n_1 \sin\theta_1 = n_2 \sin\theta_2$

What happens if $\theta_1 = 0$?
Then, $\theta_2 = 0$ too! (No refraction)

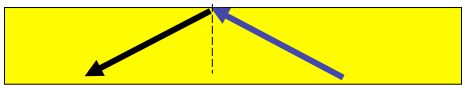


An observer at O sees the fish at...
A) a greater B) the same C) a smaller
... depth, than it really is.





A light ray inside glass is totally internally reflected from an air-glass interface

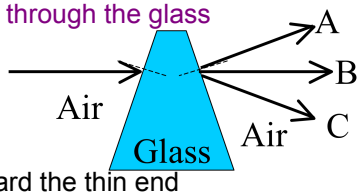


The air surrounding the glass is replaced with water. With the same light ray in the glass, total internal reflection will now...

A: definitely not occur.
B: definitely occur.
C: not enough info!

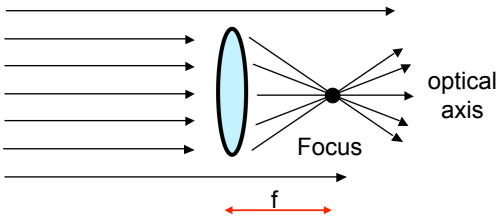
NOTE!
n(glass)>n(H2O)

A ray of light passes thru a sheet of glass which is thick at the bottom and thin at the top. Which way is the ray traveling after it has passed through the glass

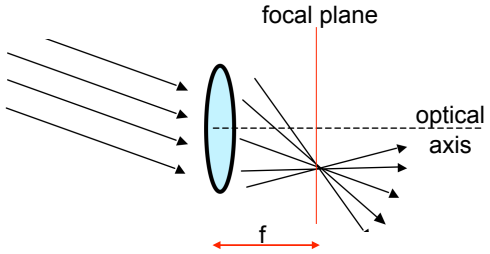


A: bent toward the thin end
B: undeviated
C: bent toward the thick end

Converging lenses



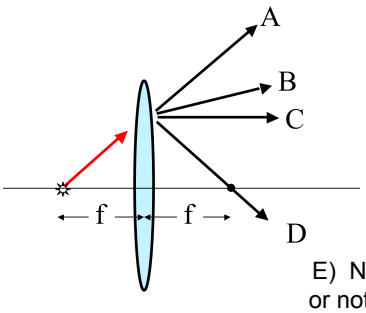
Converging lenses



A converging lens has focal length
f = 20 cm when it is in air. The lens is made of glass with index of refraction $n_{glass} = 1.6$.
When the lens is placed in water ($n_{water} = 1.33$), the focal length of the lens is...

A) Unchanged.
B) Greater, f > 20 cm.
C) Smaller, f < 20 cm

Which ray continues of the red ray?



E) None of these, or not enough info!