

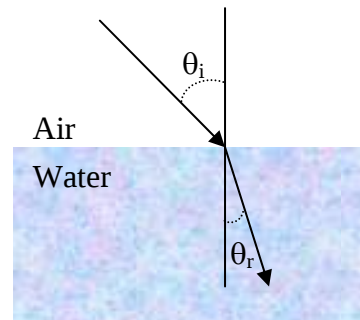
Name: _____

Date: _____

Section C D F

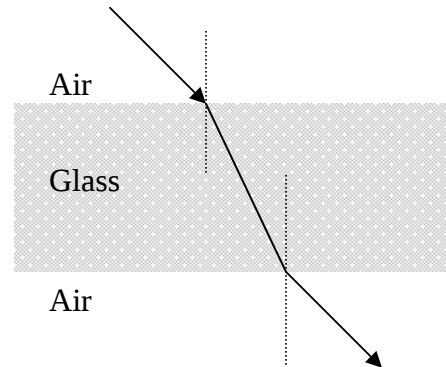
Refraction I: Snell's Law

1. Light passes from air ($n_{\text{air}} = 1$) into water ($n_{\text{water}} = 1.33$) at an angle of incidence of 43.0° .
 - a. Determine the angle of refraction in the water.



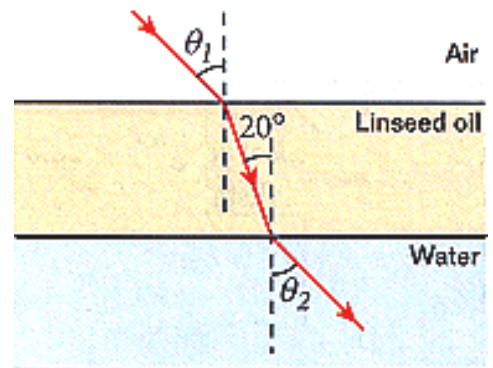
2. A ray of light enters the top of a glass of water, and makes a 60° between the incident ray and the surface of the water.
 - a. What is the angle of incidence? Draw a diagram, and label all elements necessary.
 - b. What is the angle between the refracted ray and the vertical?
3. The angles of incidence and refraction for light going from air into a material with a higher index of refraction are 56.0° and 36.0° , respectively. What is the index of refraction of this material?
4. A narrow ray of yellow light from glowing sodium ($\lambda = 589 \text{ nm}$) traveling in air strikes a smooth surface of water at an angle of $\theta_i = 39.0^\circ$. Determine the angle of refraction, θ_r .

5. Every time a beam of light passes through a window, refraction occurs. If the beam of light strikes a window pane ($n_{\text{glass}} = 1.5$) at an angle of 42° with the vertical:
- Calculate the angle of refraction as the light enters the block of glass.



- As the ray is passing through the window pane, and into the house, the light ray refracts again. If the ray of light is passing from glass ($n_{\text{glass}} = 1.5$) into the house ($n_{\text{air}} = 1.00$), find:
 - Incident angle
 - Refracted angle
- What do you notice about 5.a and 5.b.ii?

6. The light ray shown in the figure below makes an angle of 20.0° with the normal line at the boundary of linseed oil ($n_{\text{oil}} = 1.48$) and water ($n_{\text{water}} = 1.33$).
- Find θ_1



- Find θ_2