

Snell's Law and Ray Tracing Lesson Notes

Learning Outcomes

- How do you combine Snell's Law and geometry to analyze a complex refraction scenario and trace the path of light into and out of a material?

Snell's Law ... Revisited

Snell's law describes the mathematical relationship between the angles of incidence and refraction for light crossing a boundary.

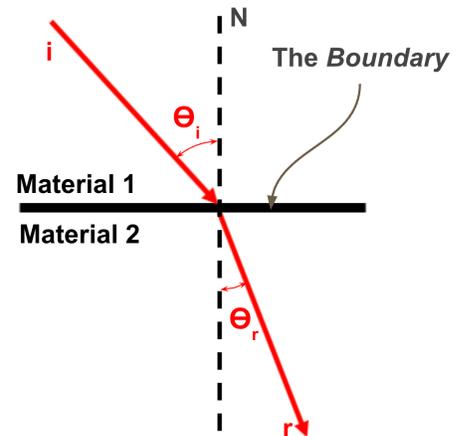
$$n_i \cdot \sin \theta_i = n_r \cdot \sin \theta_r$$

n_i = index of refraction of the incident material

n_r = index of refraction of the incident material

θ_i = angle of incidence (angle between i and N)

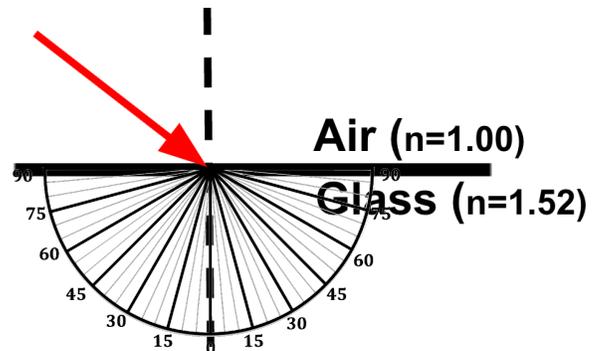
θ_r = angle of incidence (angle between r and N)



The video tutorial presents four problems with their solutions. Watch the video, show your own solutions to the problems below, and trace the path of light on each diagram. One or more protractors are provided where needed (and possible).

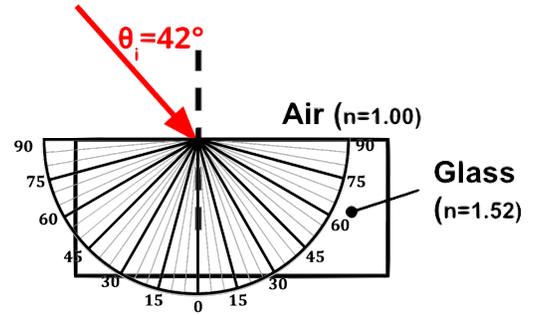
Example Problem 1: Basic Snell's Law Problem

A ray of light in air is approaching the boundary with water at an angle of 52 degrees. Determine the angle of refraction of the light and draw the refracted ray on the diagram.



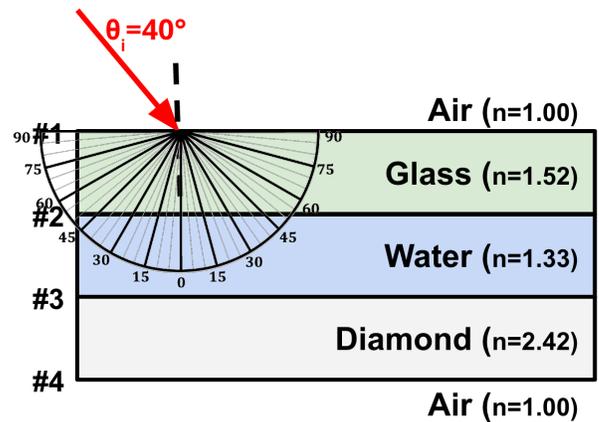
Example Problem 2: Layer Problem

A ray of light in air is approaching the boundary with a layer of crown glass at an angle of 42.0 degrees. Determine the path of light into and out of the crown glass.



Example Problem 3: Multiple Layer Problem

Trace the path of the light ray through the following series of layers.



Example Problem 4: Triangular Prism Problem

Light in air is incident upon an equiangular glass prism ($n=1.52$), approaching at an angle of 20.0° with respect to the boundary. Trace the path of light through the prism.

