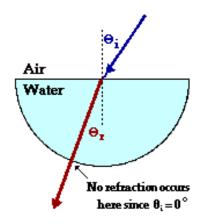# Refraction Part 1
Snell's Law

Purpose:

To use Snell's Law to find the refractive index of
various materials.

Materials:

Semicircular plastic or glass block
Semicircular water container filled with water
Ray box with single slit aperture
Protractor
Blank Paper

Procedure:

1. On the blank paper, trace the semicircular outline of the plastic or glass block.

2. On the straight side of the semicircle on the paper, mark the centre and draw the normal.

3. Draw in a series of lines incident at 10º, 20º, 30º, 40º, 50º, 60º, and 70º from the normal.

4. Darken the room. Place the semicircular plastic or glass block on the page, matching the outline of the semicircle. Shine a ray along the normal the check the position of the block.

5. Shine the light along the incident lines drawn on the sheet. Mark the point at which they exit the semicircular block. Make sure you keep track of which incident ray goes with each refracted ray.

6. Remove the semicircular block and draw in the refracted rays.

7. Measure the angles of refraction and complete the table below.

Table 1:

Angle of incidence θ_i	Angle of refraction θ_r	$\sin\theta_i$	$\sin\theta_r$	$\sin\theta_i/\sin\theta_r$

8.   Repeat Steps 1-7 for the semicircular water container filled with water.

Table 2:

Angle of incidence θ_i	Angle of refraction θ_r	$\sin\theta_i$	$\sin\theta_r$	$\sin\theta_i/\sin\theta_r$

Analysis:

The ratio $\sin\theta_i/\sin\theta_r$ is equal to the refractive index of the material. Explain why:

What do you calculate for your refractive index of the plastic or glass block? $n =$ _____

What do you calculate for the refractive index of the water? $n =$ _____

The expected refractive index of the plastic or glass block is 1.5 and for the water is 1.33. Calculate your percent error for each:

$$percent\ error = \frac{|expected\ value - experimental\ value|}{expected\ value} \times 100$$

For the plastic or glass block: For the water:

Please attach your papers showing your incident and refracted rays to this sheet.