

Name: _____

Hour: _____

Refraction in Water

Purpose: to use Snell's Law to determine the index of refraction of water

Warning:
Handle lasers and with care. Do not point lasers around the room.

Procedure:

1. Use the 360° protractor template. Draw lines extending from the center to the angles 10°, 20°, 30°, 40°, 50°, 60°, & 70° in the upper left quadrant.
2. Fill the refraction cup 2/3 full of water and place carefully onto the template. The center of the flat side of the refraction cup should be at the center of the protractor with the round side toward the bottom of the page (0° above and below and 90° at the sides).
3. Use a laser and aim it carefully along the 10° line so that you can see the refracted light exiting the back side of the cup. Mark and label the point where the refracted light ray intersects with the protractor circle. Repeat for the other 6 incident light ray lines.

Data:

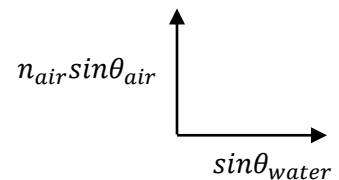
Index of refraction of air: _____

Angle in Air	0	10	20	30	40	50	60	70
Sin(θ_A)								
Angle in Water								
Sin(θ_W)								

4. Solve the Snell's Law equation for the index of refraction of water and create an excel graph where the slope will equal the index of refraction of water.

$$n_{air} \sin \theta_{air} = n_{water} \sin \theta_{water}$$

$$n_{water} = \frac{n_{air} \sin \theta_{air}}{\sin \theta_{water}}$$



5. Have teacher sign off on your graph. You must include a title, axis labels, and a line of best-fit with the equation displayed on the graph.

Teacher Initials: _____

6. Record your experimental index of refraction of water (slope of graph): _____

Questions

1. The accepted value for the index of refraction of water is 1.333. Calculate the percent error for your experimental index of refraction.

2. Using your value of the index of refraction of water, calculate the speed of light in water.

3. What would happen to the light as it traveled through the refraction cup if the index of refraction of the fluid inside were equal to 1?

Results:

What is your experimental index of refraction of water? What is your calculated percent error?

Discussion:

List and briefly explain 2 measurement errors that might have affected your results.