Refraction Lab (Mr. Konichek)

LAB: Refraction of Light—Part 1

Index of Refraction for H_2O

Procedure:

- Set laser at 10-15º & use clamp to hold down laser button (**UNCLAMP THE BUTTON WHEN FINISHED**)
- On vertical tape strip, mark un-refracted laser dot (**Un**) (**CAUTION: ONCE SET UP DON'T MOVE BEAKER!!)**
- Fill beaker 2/3 full with H_2O & mark water line 1 (**WL 1**) & refracted line 1 (**Re 1**)
- Add more H_2O and mark **WL 2** & **Re 2**
- **h = Re to WL & h' = Un to WL**
- **Calculate n_{water} = h/h' for both trials & % error**

WL 2__

WL 1__

Un

Re 1

Re 2

LAB: Refraction of Light—Part 2

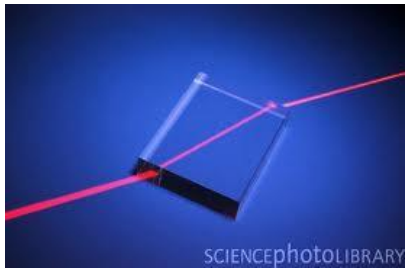
Unknown = Plexiglas

Speed of light in Unknown

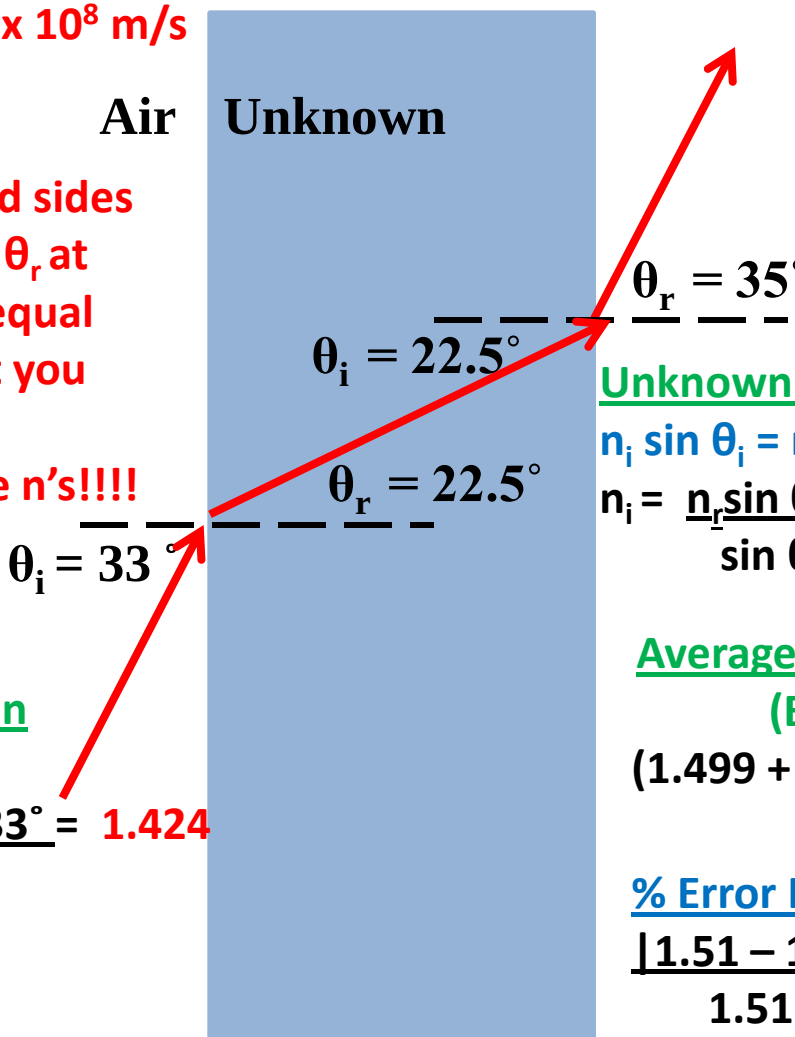
$n = c/v_s$

$v_s = c/n = \frac{3 \times 10^8 \text{ m/s}}{1.46} = 2.05 \times 10^8 \text{ m/s}$

Explanation: This sketch shows…



NOTE: Use CLEAR not frosted sides and θ_i at the 1st interface & θ_r at the 2nd interface should be equal because both are air—If not you will need to do 2 Snell Law calculations and average the n's!!!!



Unknown Index of Refraction

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

$n_r = \frac{n_i \sin\theta_i}{\sin\theta_r} = \frac{1.000293 \sin 33^\circ}{\sin 22.5^\circ} = 1.424$

Unknown Index of Refraction

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

$n_i = \frac{n_r \sin\theta_r}{\sin\theta_i} = \frac{1.000293 \sin 32^\circ}{\sin 22.5^\circ} = 1.499$

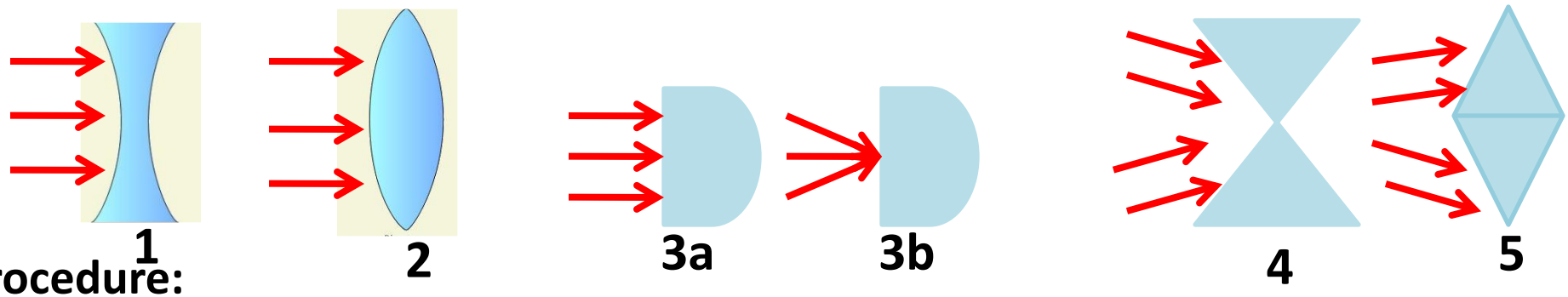
Average Index of Refraction (Experimental)

(1.499 + 1.424)/2 = 1.46

% Error Index of Refraction

$\frac{|1.51 - 1.46|}{1.51} \times 100 = 3.31\%$

LAB: Refraction of Light—Part 3



Procedure:

- As a group , trace the paths of the light rays through the different shapes
- Test the shapes for reversibility (does it follow the same path back?)
- Make **summary table**: shape, converging/diverging & reversibility

LAB REPORT REQUIREMENTS:

- Follow lab report handout for guidelines (I do not need it typed though)
- Each part should have its own data table (or use data table provided)
- Include Lab handout with tape on it from Part 1 (or on a blank sheet of paper)
- Part 2 sketches: put your name, block material name, sketch description explanation, clearly labeled & diagramed & ALL calculations clearly shown: Vs, n's & n_{ave} & % error (each person does a different unknown)
- Part 3 Sketches: clearly diagramed & labeled & summary table
- One Part 1 & Part 3 & conclusion & summary per group – Part 2 each person