Snell's Law Formal Lab

Prelab [20 marks]:

Answer the following questions as preparation for the lab and include it in the appendix of your lab report:

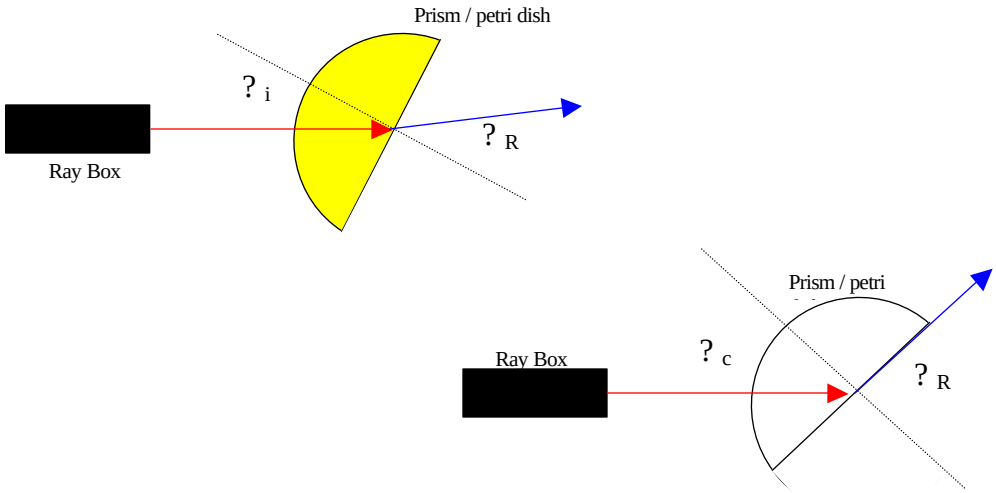
1. What is light? [1]
2. What is the speed of light in vacuum? [1]
3. What does index of refraction mean? (Formula as well as explanation) [2]
4. When does refraction occur? [2]
5. What are the necessary conditions for total internal reflection? [3]
6. Describe the critical angle in terms of the angle of incidence and the angle of refraction. [2]
7. Describe and explain one application of total internal reflection. [3]
8. Derive, using a diagram, Snell's law. [6]

Lab: [40 marks]:

Materials:

(1) Rive Ray Box with card
(1) Protractor Template
(1) Semi-Circular prism
(1) Semi-Circular petri dish

Design:



Procedure:

1. Send a beam of light from the ray box into the semi-circular prism (curved side) so that it enters perpendicularly (i.e. no refraction) and leaves on the flat side. (see above diagrams)
2. Adjust the medium at an angle and measure the incident and refracted angles.
3. Repeat step 2 for two more angles.
4. Calculate the n for the prism using Snell's Law and n=1.00 for the air.
5. Repeat 1 to 4 for a semi-circular petri dish filled with water and again for a semi-circular petri dish filled with an unknown substance.
6. Using the n values calculated in 4 & 5, <u>calculate</u> the critical angle for each medium.
7. <u>Measure</u> the critical angle in each medium and compare to the values calculated in 6.
8. Using the multiple ray setup with the ray box (see teacher if you need help), and the prism, draw two diagrams showing the rays entering the flat and curved side and the resulting ray paths. Explain what is happening and show with a detailed diagram the path of one refracted ray.

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Write-Up:

Formal lab report with the following sections:

- Purpose [1]
- Materials [1]
- Procedure [1]
- Observations [2]
- Analysis (Ensure the following points are addressed) [10]
    - How the theoretical (calculated) values compare to the measured values for n and q_C
    - Research n values to try and determine composition of mystery fluid
- Conclusions [5]
- Appendices (including)
    - All tabulated raw/calculated data [10]
    - Sample calculations [5]
    - Graph of incident verses refracted angle for given materials [5]
    - Pre-lab

Lab Skills :(observed during lab)[10 marks]

- Prepared for lab
- Proper use of equipment
- Proper deportment during lab
- Clean-up

Lab total /70

What is light?

Due 2nd class after lab

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