FLINN SCIENTIFIC

Name_____

Laser Pointer Activity Student Data Tables

Part 1. Light Interaction

Data Table 1

	Observations
Green filter	
Red filter	
Blue filter	

Data Table 2

	Observations
Green filter	
Red filter	
Blue filter	

Data Table 3

	Observations
Laser through polarizer	

Part 2. Reflection

Data Table 4

Incident Angle	Reflected Angle
30º	

Part 3. Refraction

Data Table 5a

	Observations
Original beam compared to beam traveling through water	

Data Table 5b

Incident Angle	Reflected Angle
30º	

Data Table 6

	Observations
Internal Reflection	Total Internal Reflection Minimum Angle:

Part 4. Diffraction

Data Table 7

	Diffracted Angle
Left Bright Lineº	
Right Bright Line	
Average	

Data Table 8

Incident Angle	Diffracted Angle
Upper Left Bright L ine	
Upper Right Bright Line	
Average	
Lower Left Bright Line	
Lower Right Bright Line	
Average	

Post-Lab Questions *(Answer on a separate sheet of paper.)*

1. Which color filter transmitted the most light? Explain.
2. Which colored paper reflected the most light? Explain.
3. Explain why the blue and green strips of paper also reflected red light.
4. According to your observations of laser light traveling through a polarizing filter, is laser light polarized?
5. In your own words, explain the law of reflection. (*Optional:* What mathematical equation describes the law of reflection?)
6. *(Optional)* Assume a person is standing in front of a vertical mirror. What is the minimum height the mirror must be in order for a person to see his or her entire reflection.
7. Snell's law is given by:

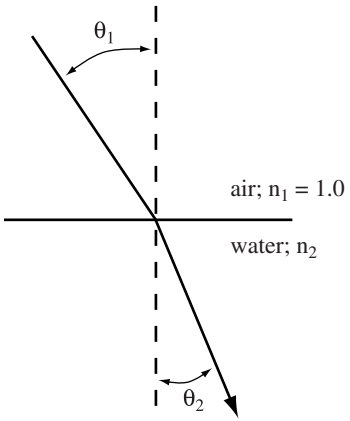
$$n_1 \sin \theta_1 = n_2 \sin \theta_2 \qquad \textit{Equation 2}$$

n_1 = index of refraction of incident medium

θ_1 = incident angle of light beam (with respect to the vertical) at the media boundary

n_2 = index of refraction of exiting medium

θ_2 = exiting angle of light beam (with respect to the vertical) at the media boundary



Use Equation 2, and the data from Experiment 5, to determine the index of refraction of water.

8. The accepted value for the index of refraction of water at 20° C is 1.333. How do your results compare with the accepted value?
9. When total internal reflection first occurs (the critical angle), where does the transmitted beam go?
10. Using Snell's law (Equation 2), and the critical angle measured in Experiment 6, determine the index of refraction of the plastic dish. Use the accepted value for the index of refraction of water found in Question 8.
11. Can total internal reflection occur when light travels from air into water? Why or why not?
12. From the data collected in Experiment 7, use Equation 1 (found in the *Background* section) to determine the wavelength of the laser light. The number of lines per millimeter of the diffraction grating is 950 lines/mm.
13. Were the diffracted light lines brighter or dimmer than the center line?
14. Why are the locations of the bright bands different when the light diffracts in air compared to when the light diffracts in water?
15. Determine the index of refraction of water using Equation 1, Equation 2, and the data collected in Experiment 8.