Reflection and Refraction Lab Report Outline

(based on Dr. Laura Penny's suggestions)

Title:

Objective: To verify the Law of Reflection and the Law of Refraction (Snell's Law)

Procedure 1: Reflection of Light

- Using a light ray box and a plane mirror reflecting surface, we performed three trials:
  - $\theta_i = 30.0°$ (or a smaller angle)
  - $\theta_i = 45.0°$
  - $\theta_i = 60.0°$ (or a greater angle)
- We expect that $\theta_i = \theta_r$ (from the law of reflection)
- Note that it helps to draw the outline of the reflecting surface, and a normal to this outline, before you start using the ray box.

Results: Our results are shown in Table 1.

Table 1	Trial 1	Trial 2	Trial 3
θ_i	28	45	62
θ_r	29	44	63
Difference (%)			

(statements about how well your θ_i and θ_r agree.)

Procedure 2: Refraction of Light

- Using a light ray box and a glass prism, we performed 2 trials. Each trial has two refractions (from the interface where the light enters and where it leaves the prism), giving us 4 values for the index of refraction of the glass, n_g.
  - $n_g \sin\theta_g = n_a \sin\theta_a$
  - Remember that the refractive index of air $n_a = 1$.
- Note that it helps to draw the outline of the prism, and a normal to the horizontal sides, before you start using the ray box.

Results: Using Snell's Law, we calculated n_g for each refraction – see attached sheets.

(Attach the sheets with the drawn light rays AND with the calculations.)

Results: Our results are shown in Table 2

		Trial 1	Trial 2
1st refraction	θ_a	12	40
	θ_g	8	27

	n_g	1.49	1.42
2nd refraction	θ_a	71	28
	θ_g	38	18
	n_g	1.54	1.52

Average n_g: 1.49

Conclusions: (Did your experiments agree with a) the Law of Reflection?

b) Law of Refraction?)

Procedure 3: Measuring the refractive index of water.

Draw the outline of the semicircular tray, and a normal to the flat side.

Fill the tray with water. Place the tray on the paper, fitting it within the outline you have drawn.

Let a ray from the ray box be incident on the flat side of the tray, at the point where the normal intersects the flat side. Measure the angle of incidence θ_a.

Mark the point on the semicircular trace where the light seems to be exiting. Remove the tray. Connect the point you have just marked to the ray's entry point. Measure the angle of refraction θ_w.

- $n_a \sin\theta_a = n_w \sin\theta_w$

Calculate the refractive index of water.

n_w: 1.24

% error: 6.9%