Snell's Law

1. Lab write up and online simulation

You can find the write up here. Use the theory, experimental procedures, and questions from the write up. You will be referencing the write up combined with the instructions given in this file to run the online experiment, which can be found here. We skip Section 3.4.

2. Section 3.2

Objective:
Observe refraction and measure index of refraction.

Procedure:
Select "Prisms" with a square block. See illustration below.

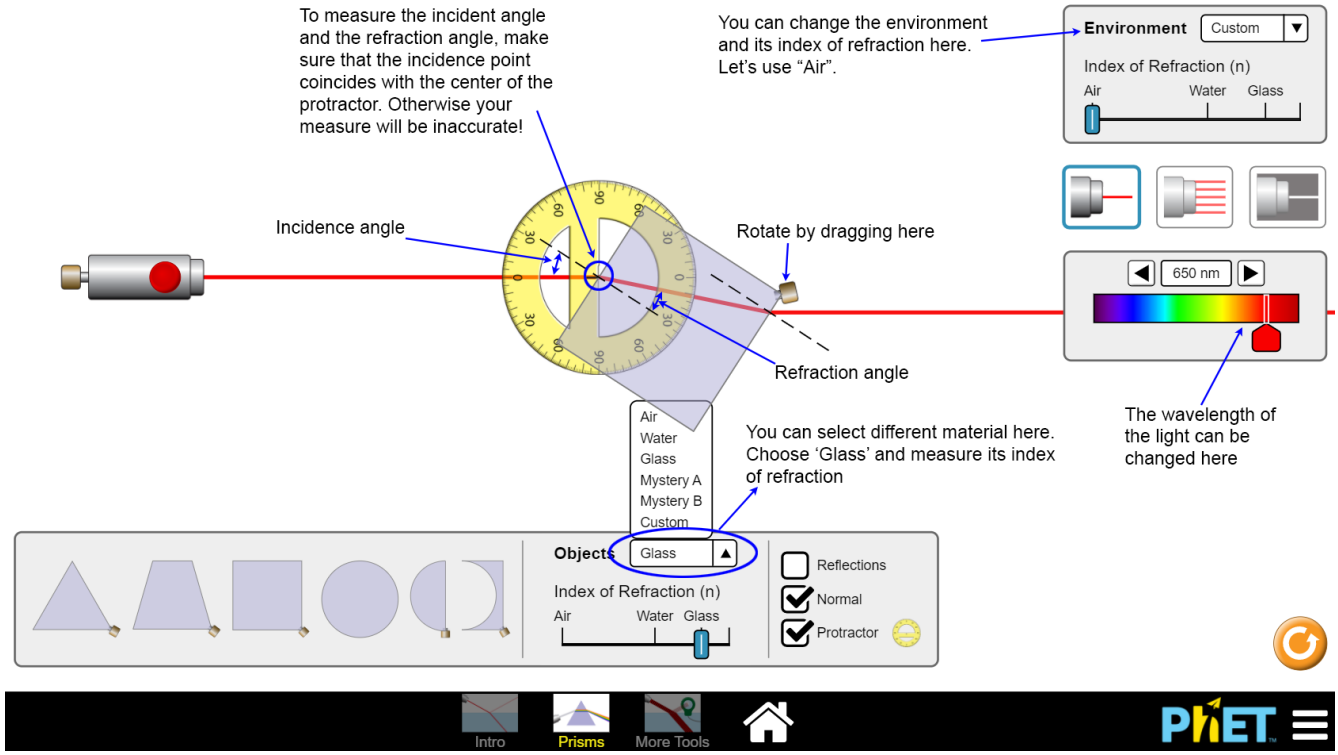

Figure 1. Instruction for Sec 3.2.

For each incidence angle, measure the refraction angle. Then compute the indexes of refraction and their average. We only try 4 incidence angles, not 6.

Angle of incidence	Angle of refraction	Index of refraction
15°		
22°		
30°		
40°		

Table 1. Data table for Sec. 3.2.

Questions:
Skip the first question.

(1) ~~When you go beyond 60° what starts to happen to the beam? Explain.~~

(2) Explain what happens to the beam inside the parallel bar.

(3) What are the possible reasons your data can be off?

(4) With the acrylic parallel bar can you obtain total internal reflection? Why or why not?

(5) If you used a green laser beam will the refraction be higher or lower? Explain.

Figure 2. Questions for Sec. 3.2. Skip the first question.

3. Section 3.3

Objective:
Observe total internal reflection.
Procedure:
Select "Prisms" with a standard triangle. See illustration below.

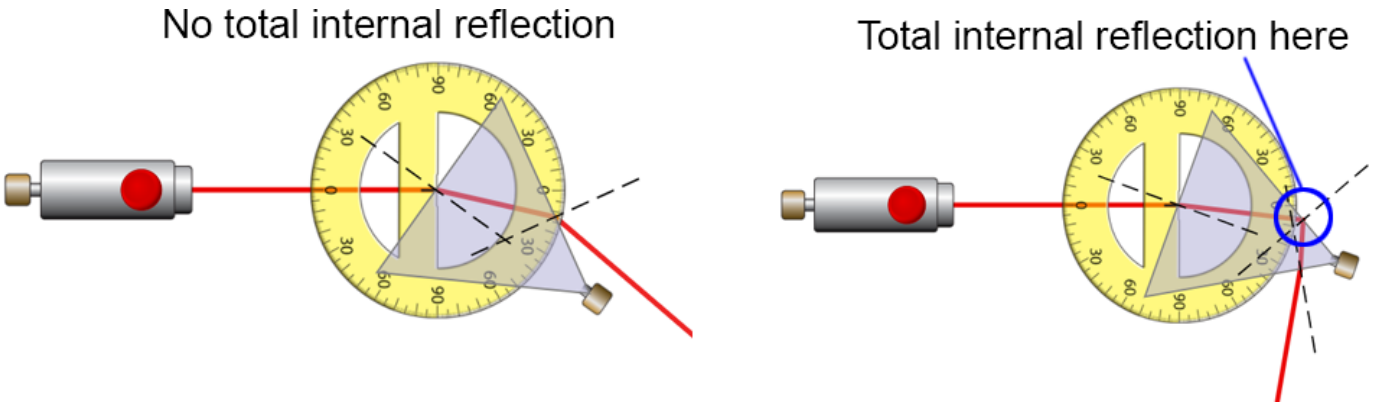

Figure 3. Setup for Sec. 3.3. Left: no total internal reflection. Right: total internal reflection occurs.

Questions:

(1) How was the triangle arranged on the round ray table?

(2) What surface angle did you use and why? Explain.

4. Skip Section 3.4

5. Section 3.5

Objective:
Measure the critical angle for total internal reflection.
Procedure:
Set up the simulation as shown below. Measure the critical angle for "Glass" and compare it with the theoretical value, which can be computed from Equation 3 given in the write up. You can use the index of refraction of "Glass" you measured in Sec. 3.2 for the computation. If you select a different material for this section, you will need to measure the index of refraction for the material you selected, and then compute the theoretical critical angle.

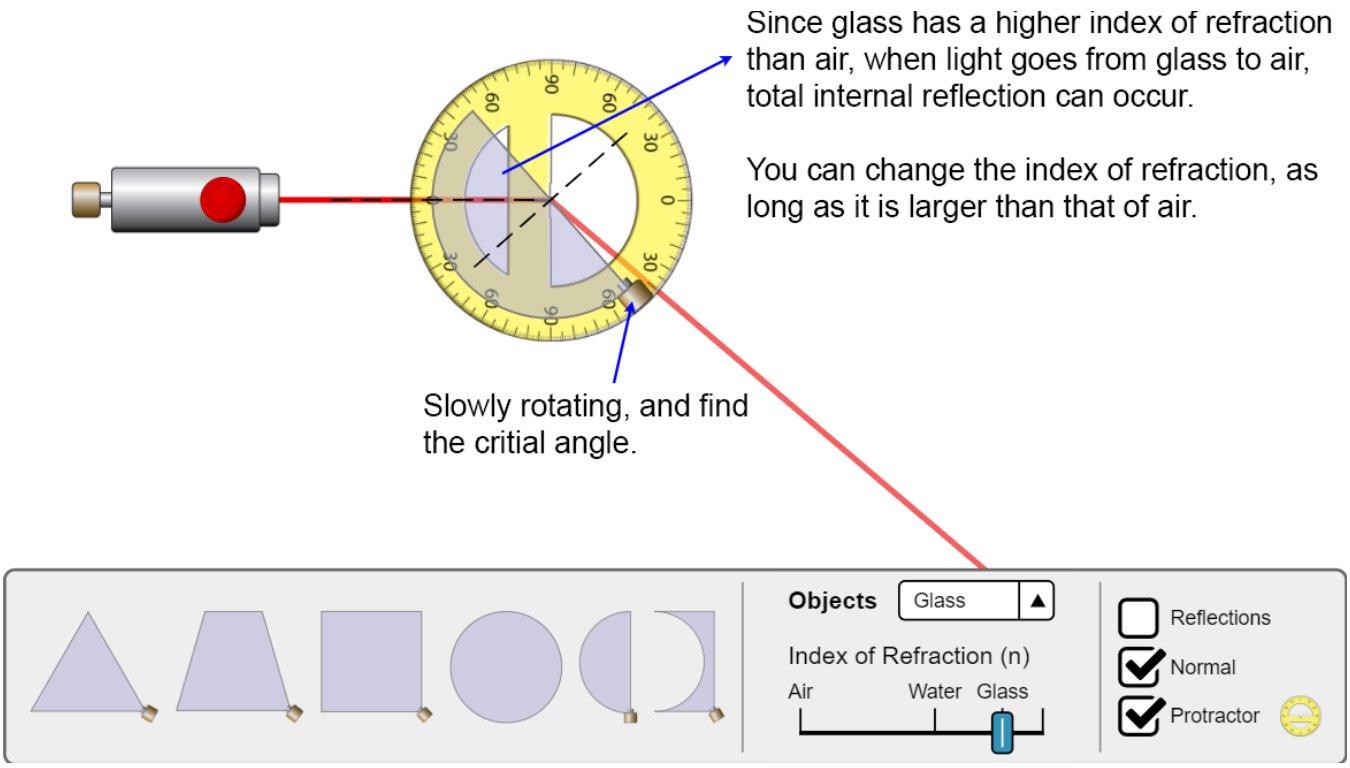

Figure 4. Setup for Sec. 3.5. Measure the critical angle for total internal reflection.