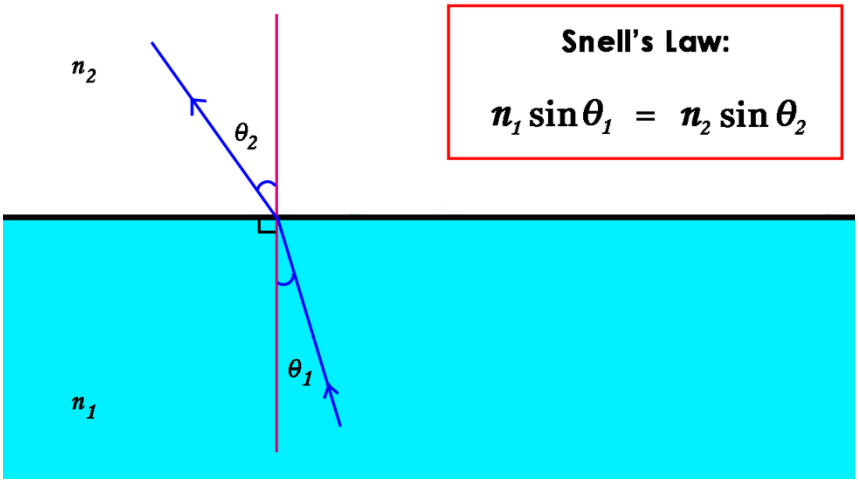
Name: _____ Period: _____ Date:_____

Refraction Lab Activity – Student Edition

Refractive Index of Various Lenses

Background Information:

Refraction is another behavior that light exhibits as it interacts with different media. It is simply defined as the bending of light due to its change in speed as it strikes on different materials with various densities. The extent of refraction of light is dependent on the medium's refractive index. Every material has a **refractive index**, a dimensionless number that describes how fast light travels through it. The higher the refractive index of a material, the more that light will bend as it passes through it. This number can be obtained using the **Snell's law** or the **law of refraction** . Similar to reflection, refraction also involves the angles that the incident ray and the refracted ray make with the normal to the surface at the point of refraction. But unlike reflection, refraction depends on the media through which light rays are travelling. This dependence is explicitly made known in material's refractive index. In this laboratory activity, you will compute the refractive index of various media using the Snell's law.



In the law of refraction, $n_1 \sin \theta_i = n_2 \sin \theta_r$.

Learning Objectives:

By the end of this lab activity, you will be able to:

- Explain how light is refracted in various media.
- Describe the refractive index of various lenses.

Name: _____ Period: _____ Date:_____

Refraction Lab Activity – Student Edition

Pre-lab Questions:

1. Define the following terms:
   a. Normal line

   _____

   _____

   b. Incident ray

   _____

   _____

   c. Refracted ray

   _____

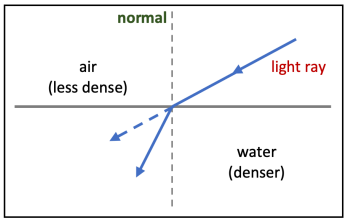
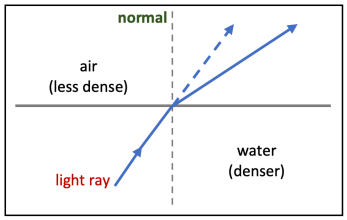
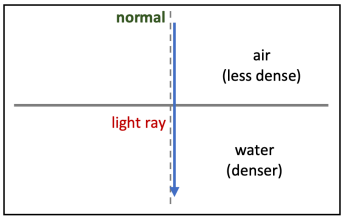
   _____

   d. Angle of refraction

   _____

   _____

2. Explain the bending of light in each diagram based on the law of refraction.

	Diagram	**Explanation from the Law of Refraction**
a.		_____ _____
b.		_____ _____
c.		_____ _____

Name: _____ Period: _____ Date:_____

Refraction Lab Activity – Student Edition

Laboratory Proper:

Materials:

- eyeglasses lens
- magnifying lens
- camera lens
- laser pointer
- protractor
- calculator

Procedure:

1. Position the laser at an angle of **30^0 with the normal line** of the lens. This will be the angle of incidence for all set-up.
2. Label the lens according to their use or type.
3. Shine the laser pointer on each lens and observe how the light bends. For each lens, measure the angle of refraction of a laser using a protractor.

   Safety Alert! Be sure not to point the laser pointer to your eyes or classmates' eyes. This may cause damage to the eyes if not used properly.
4. Do three trials for each lens.
5. Record your measurements in the given table and describe the refraction index of various lenses based on how light is refracted in it.

Observations:

Table 1. Measured angle of refraction of various lenses.

Lens	Angle of Incidence, degrees	Angle of Refraction, degrees				Description of Refractive Index
		Trial 1	Trial 2	Trial 3	Average	
A	20					
B	30					
C	40					

Name: _____ Period: _____ Date:_____

Refraction Lab Activity – Student Edition

Post-Lab Questions:

Answer the following questions:

1. Is refraction evident in the three lenses? What made you say so?

   _____

   _____

2. In which lens is light most bent? Least bent?

   _____

   _____

3. Which lens has the greatest refractive index? Least refractive index?

   _____

   _____

4. Is there any relationship that you can infer from the activity?

   _____

   _____

5. What is the relationship between the bending of light and the refractive index of the material?

   _____

   _____