

Iona Prep Honors Physics

REFRACTION

Because of multiple snow days and other interruptions, I am going to have you to learn part of chapter 17 from the textbook and the following assignments. This material is important for the rest of the chapter which we will cover together in class.

Reading/Writing Assignment (Monday)

You may use the online textbook or the actual textbook for the reading/writing assignment

Read pages 596- 600

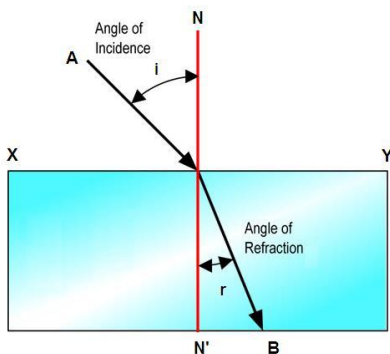
Answer the following questions in your notebook. (You may discuss this with your partner, but in the end BOTH of you should know and understand the answers.)

1. Does light travel at the same speed in all substances? If not, where does it travel the fastest?
2. In this chapter the symbol c stands for what?
3. What is the definition of the index of refraction of a material?
4. Looking at table 17.1 on page 598 and answer the following questions (A) In which of the substances does light travel the fastest? (B) In which of the substances does light travel the slowest?
5. What is the definition of the word Refraction?

Just like the angles of incidence and reflection were defined in terms of the "Normal", so too the angle of refraction is defined in terms of the Normal. Answer these questions by reading pages 599 and 600 and consulting Figure 17.3 on page 599.

6. What is the definition of Normal in the context of mathematics and science?
7. What is the definition of angle of incidence?
8. What is the definition of angle of refraction?

In the diagram below: Light ray AN is the incident ray. It strikes the boundary between air and another substance (XY). Line NN' is the normal. Line NB is the refracted ray. The angle of incidence and angle of refraction are indicated.



Laboratory Assignment (Tuesday)

You will perform an online lab where light traveling in air enters another substance. You will have the equipment measure the angle of incidence and angle of refraction and then you will calculate the index of refraction of the substance. (You may work with your partner, but in the end BOTH of you are responsible for understanding this material.)

1. Go to <http://www.ionaphysics.org/classroom/Physlets2/IonaPuzzles/Refraction.htm>
2. Record the code number.
3. Experiment with the controls. Notice that clicking the button "Increase $\angle i$ " causes the angle of incidence to increase by 1 degree. The equipment also reports the angle of refraction to the nearest degree.
4. As you work with this lab, record data in a table. Record 10 different readings. Your angles of incidence should be spread out with a few below 20 degrees, some between 20 degrees and 50 degrees, and some between 50 and 80 degrees. You should collect a total of 10 readings.
5. Complete the table by entering the sine of each angle and computing the index of refraction for each trial. The index should have no more than 3 significant figures.
6. Finally, calculate the average value for the index of refraction.
7. Your conclusion for the lab will be "The code number was ___ and the index of refraction was found to be ___"
8. Complete the lab report and print it out. It is due in class on Thursday. The report will contain your data and conclusion. It is NOT necessary to have a procedure or diagram.

Lab Report: Index of Refraction

Names _____ Date _____

$\angle i$ (degrees)	$\angle r$ (degrees)	$\sin \angle i$	$\sin \angle r$	index = $\sin \angle i / \sin \angle r$
XXXXXXXXXX	XXXXXXXXXX	XXXXXXXXXX	AVERAGE >>>>>	

Conclusion: The code number was _____

The index of refraction was found to be _____

Summary Assignment: Wednesday

Answer the following questions in your notebook: (Again, you may work with and argue with your partner, but in the end BOTH of you are responsible for knowing and understanding the material.

1. If light enters a substance having a higher index of refraction does it speed up or slow down?
2. If light enters a substance having a higher index of refraction does it bend toward the normal or away from the normal?

Refer to the table on page 598 to answer the following questions:

3. Will light travel faster in water or in ice?
4. What is the speed of light (in m/s) when it is traveling in Benzene?
5. When light is traveling in air and enters Flint glass will it bend toward or away from the normal?
6. When light is traveling in Flint glass and enters Crown Glass will it bend toward or away from the normal?