Name________________________________ Date___________________
Physics Lab Due Date____________

Jell-O® Optics

Introduction:
Material science is one of the fastest growing fields in science today. Everyday new materials are created and their physical and chemical properties need to be studied . In this lab you will be investigating the optical properties of Jell-O.

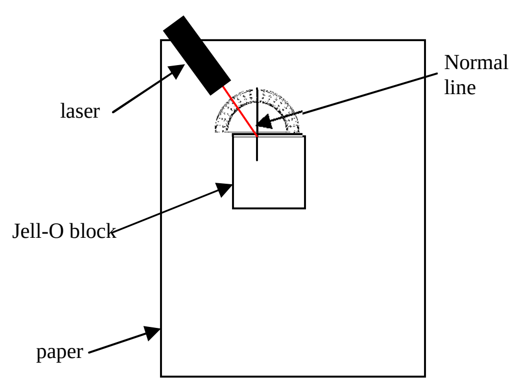
Pre-lab Questions:
1. Will the light traveling through Jell-O move faster or slower than light traveling in air? Why?

2. What equation can tell us the speed of light in a substance?

3. What variable do we need to know in order to find the speed of light in that substance?

4. Do you predict that variable to be greater or less than 1? Why?

Procedure:
1. Using your protractor, draw a line that is normal, and extends into, to the upper right hand corner of the three squares labeled "Jell-O block".
2. Align your protractor along the top of the Jell-O block outline so that the normal line runs through the 90° mark.
3. Very carefully slide your Jell-O (and the wax paper it is sitting on) on top of the first labeled outline.
4. Take the laser pointer and use the binder clip to hold it, making sure clip it so the "on" button is depressed.
5. Use your laser pointer to create a 20° incident ray on the Jell-O block. Remember where the 20° is measured from!



6. Observe the ray as it travels through the Jell-O. Mark the spot on the paper where the light ray emerges from the Jell-O block. Make sure you put the mark on the paper, since you will be removing the wax paper.
7. Carefully slide your Jell-O to the side (don't eat it just yet!).
8. Connect the point where the incident ray enters the Jell-O to the point where it exits the Jell-O.

9. Looking at the ray of light IN the Jell-O block, measure the angle of refraction. Again, remember where you measure the angle of refraction from! Record this value in the data table.
10. Repeat steps 1-8 for an angle of incidence of 30^o and 40^o.
11. Find the index of refraction using Snell's Law.
12. Determine the speed of light in you block of Jell-O.
13. See if you can get total internal reflection to happen in your Jell-O block by changing the angle at which you shine the laser. If you can, record the angle the angle of incidence.
14. Shine the red laser into the blue block of Jell-O. Record your observations in the box below.

Data:

Angle of Incidence	Angle of Refraction	Index of Refraction of Jell-O	Speed of Light in Jell-O (m/s)
20^o			
30^o			
40^o			
	Average		

Sample Calculations:

Observations of red laser beam in blue Jell-O:

Angle of Incidence at which total internal reflection starts:	

Conclusions:

1. How does the beam of light bend when it goes into the Jell-O?

2. Why did it bend like that?

3. How does the beam of light bend when it leave the Jell -O?

4. Why did it bend like that?

5. As the angle of incidence increases, does the beam bend more, less, or the same amount?

6. What is the name of the angle at which total internal reflection occurs?

7. Give an example of something you use everyday that makes use of total internal reflection.

8. What happened when you shined the red laser into the blue Jell-O?

9. What explanation could you give for this effect?

Jell-O Block

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