

Light Mini Labs

Name: _____

In this lab, you will investigate the mathematical models for refraction due to a medium change and diffraction in double slit experiment.

Part 1: Refraction of an Unknown Material

Light bends when traveling from medium into another. The amount of this bend is related mathematically to the material's index of refraction through Snell's Law.

$$\frac{n_1}{n_2} = \frac{\sin\theta_2}{\sin\theta_1} = \frac{v_2}{v_1}$$

Use a simulation to collect data and calculate the index of refraction for an unknown material

[Click Here for the Simulation](#)

The simulation interface includes the following elements:

- Top left: Radio buttons for "Ray" (selected) and "Wave".
- Top right: Control panel for the upper medium (Air) with "Material" set to Air and "Index of Refraction (n)" set to 1.00. A slider below shows the range from Air to Glass.
- Bottom right: Control panel for the lower medium (Water) with "Material" set to Water and "Index of Refraction (n)" set to 1.33. A slider below shows the range from Air to Glass.
- Bottom left: A panel with an "Intensity" icon and a "Normal" checkbox which is checked.
- Bottom: A black bar with the text "Bending Light" on the left and the PhET logo on the right.

Start by exploring the simulation and see what effect different set ups have on the path of the light. For example, what sorts of configurations result in the largest or smallest change in angle?

Once you have a feel for the simulation, go to the next page to do some calculations ↓

Set up the simulation according to the settings listed here to investigate the optical properties of **Mystery A** →

Top Material	Air ($n = 1.00$)
Bottom Material	Mystery A

Drag around the laser and use the protractor to collect 2 different angles of incidence and refraction. (make sure you are measuring relative to the normal line)

	Angle #1	Angle #2
Angle of Incidence		
Angle of Refraction		

Calculate the unknown index of refraction of Material A for each of these set ups in the space below. Average these calculated values together and record below

Angle #1:

Angle #2:

Mystery A - Index of Refraction

--

Part 2: Calculating the Wavelength of a Laser

When light travels through narrow slits, it produces a pattern of light and dark fringes. If you know the relationship between the different distances, you can calculate for an unknown. In this lab, your task is to calculate the wavelength of the laser used in this video.



[Click Here for the Lab Video](#)

Using data from the video, identify the variables and calculate for the wavelength of the laser in nm. List variables and show all work in the space below. (Note: be extra cautious with your units)

$$s = \frac{\lambda D}{d}$$

s	
D	
d	

Wavelength (in nm)

Check your answer:

Using [this website](#), type in your calculated wavelength in nanometers. If you are close, you should see a color similar to the green laser used in the investigation 😊

academo.org/demos/wavelength-to-colour-relationship/

Wavelength to Colour Relationship

A simple tool to convert a wavelength in nm to an RGB, hexadecimal or HSL colour.

Physics Light Colour

Share Tweet



Wavelength
380 nm
Color:
rgb(97, 0, 97)
Hex: #610061
hsl(300, 100%, 19.02%)

