IMPORTANT NOTES: Before each workshop session begins, please

1. Open this Workshop Pages file and keep it open on your desktop for the entire session.
2. Be sure to print out the Prediction Sheet that was also sent to you (or download it at https://pages.uoregon.edu/sokoloff/PredictionSheetICPE120622.pdf).

It is very important that you model correct student classroom behavior by actually recording all of your predictions on the Prediction Sheet!

Link for Information on ALOP:

https://pages.uoregon.edu/sokoloff/ALOPwebpage.html

Discussion Questions on Magic Trick

1. How do you think that the test tube was made to reappear?
2. Why can you see a test tube in air or in water, but not in the magic fluid? What is special about the magic fluid?
3. What property of transparent media determines whether reflection takes place at the boundary between them? What has to be true about this property for the two materials in order for reflection to take place?

Module 1 Example: Image Formation Demonstrations

Name________________________________

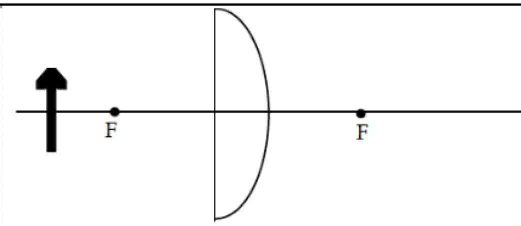
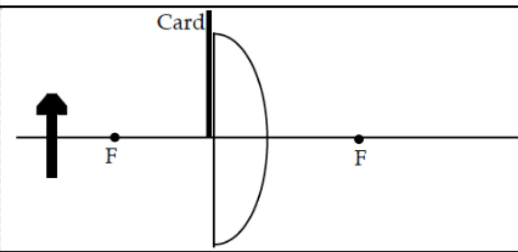
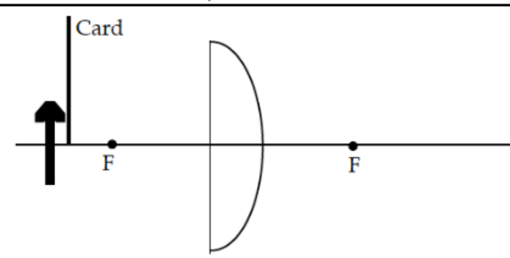
Sample Interactive Lecture Demonstration
Prediction Sheet for ICPE ALOP WORKSHOP

Directions: Students would normally write their names at the top of this sheet, and the sheet would be collected at the end of class but not graded. Please behave as a student and write your predictions in the spaces provided when asked to.

Note: This is a sample of ILDs prepared for this workshop. They do not represent a complete, coherent sequence. Normally an ILD sequence consists of 6-7 related demonstrations in a single physics topic area. Actual ILD sequences can be found in the book *Interactive Lecture Demonstrations* a PDF of which you can download at: **https://pages.uoregon.edu/sokoloff/ILDbook0116.pdf.**

Workshop Session 1

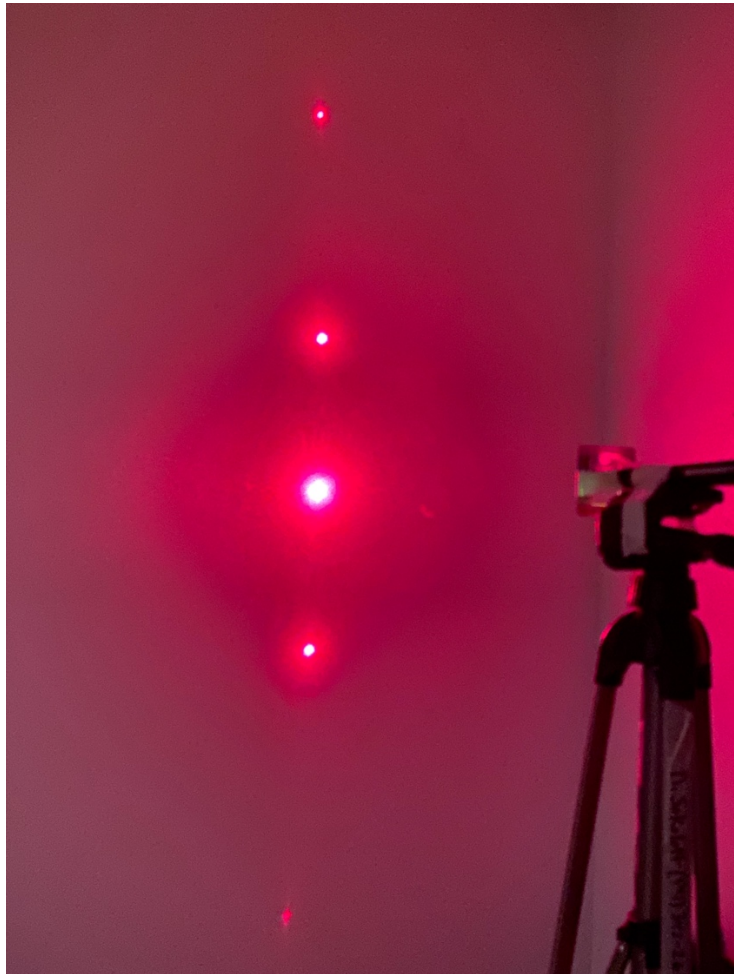
Activity from Module 1: Introduction to Geometrical Optics

Image Formation Demonstration 1: You have a converging lens. An object in the shape of an arrow is positioned a distance larger than the focal length to the left of the lens, as shown on the right. Draw several rays from the head of the arrow and several rays from the foot of the arrow to show how the image of the candle is formed by the lens. Is this a real or a virtual image?	
Image Formation Demonstration 2: What will happen to the image if you block the top half of the lens with a card? Answer in words and show what happens on the diagram on the right by making any changes needed in the rays you drew above.	
Image Formation Demonstration 3: What will happen to the image if you block the top half of the object with a card? Answer in words and show what happens on the diagram on the right by making any changes needed in the rays you drew above for Demonstration 1.	

Module 2 Example: Correction for Myopia

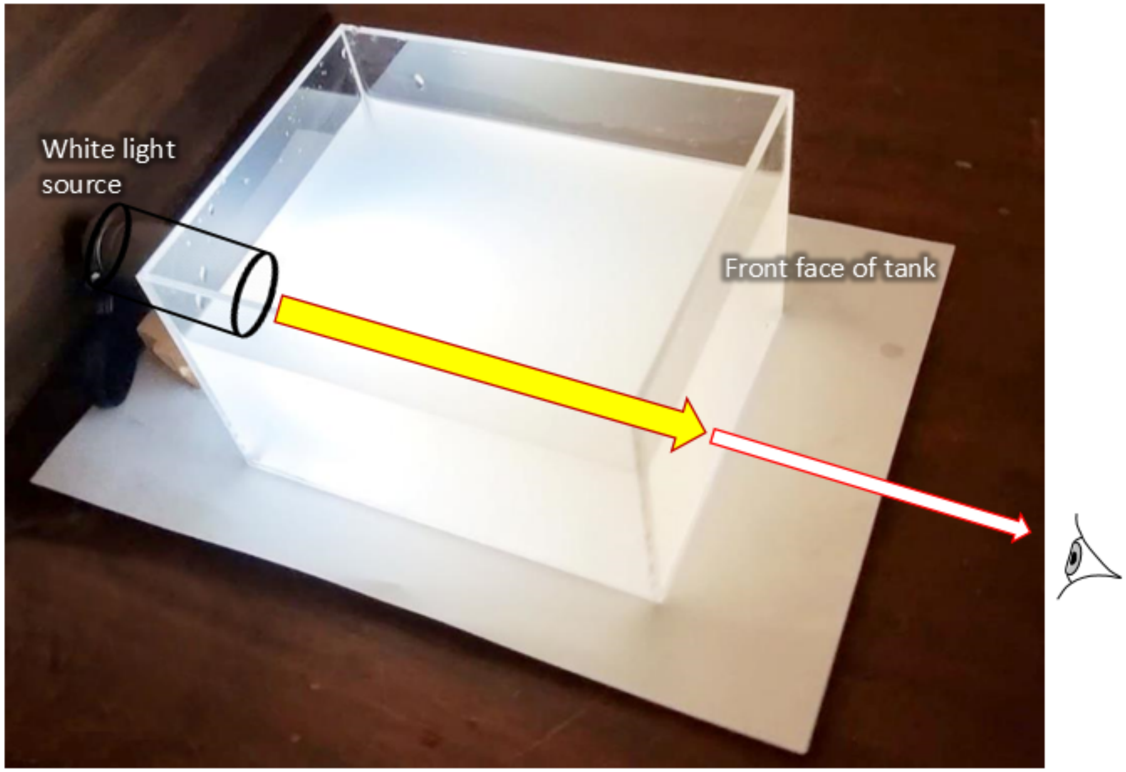
Prediction: Myopia or nearsightedness is caused by either (a) the eyeball length (distance from cornea to retina) being too long or (b) the power of the eye's optics being too strong. In both cases, the image of a distant object will no longer be sharply focused on the retina but rather in front of it. What kind of lens would you need to bring the image back into focus on the screen (retina), positive or negative? Record your prediction on the Prediction Sheet.

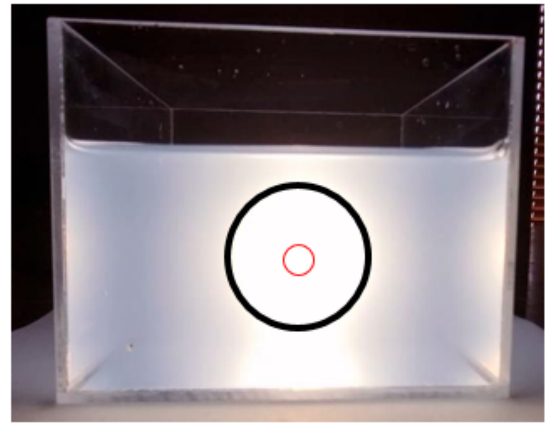
Module 3 Example: Interference and Diffraction



Prediction 3: (<u>Record your prediction on the Prediction Sheet.)</u>
Suppose that the red laser is replaced by a green one. Will the pattern on the wall be changed, and if so, how?

Module 4 Example A: Scattering of Light in Milky Water





The experimental setup:
We will look through the front face of the tank as drops of milk are added to the clear water.

Predictions 4A (<u>Record your prediction on the Prediction Sheet.</u>)

4A.1 Initially, what will you see looking through the front face of the tank, before any milk is added?

As drops of milk are added to the water…

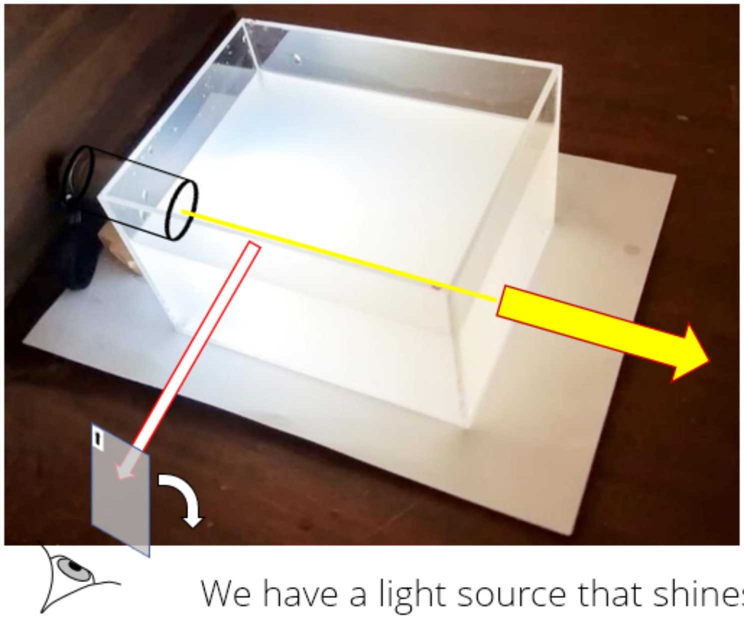
4A.2 Does the outline of the light source change?

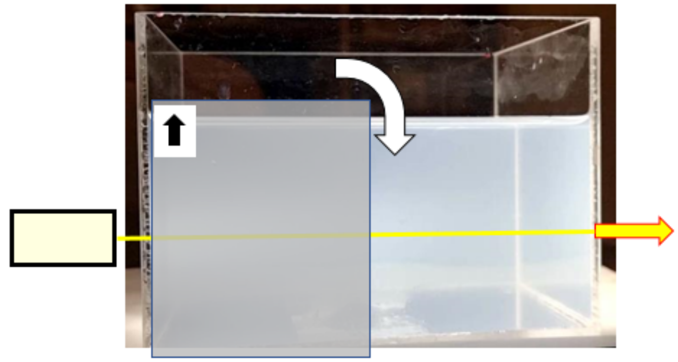
4A.3 Does the colour of the water on either side of the light source change?

4A.4 Does the colour of the light source change?

4A.5 What would you see if we replaced the single white-light source with two light sources (one red and one blue), separated by a few centimetres.

Module 4 Example C: Scattering of Light in Milky Water





The experimental setup:

We have a light source that shines through the back face of a tank that contains water and a little milk suspended in it. The milk particles scatter the light so that it is visible above and on the sides of the tank.

We look in along the side of the tank at 90 degrees to the path of the light beam.

We place a linearly-polarising filter, with its optical axis pointing vertically, then rotate the filter through 90 degrees so its optical axis is pointing horizontally.

Predictions 4C (Record your prediction on the Prediction Sheet.)

4C.1 Initially, before you insert the linearly-polarising filter, what will you see looking through the side face of the tank?

Can you see the light beam? What colour is the fluid mixture?

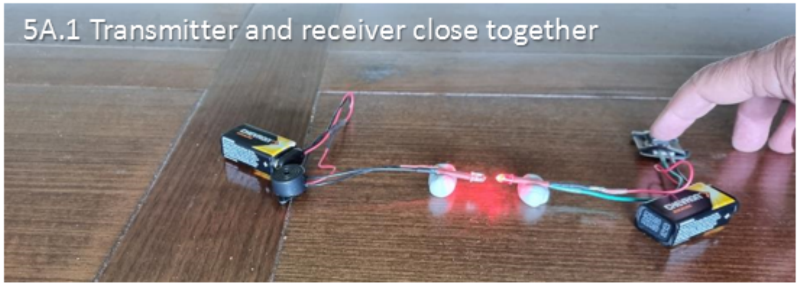
With the linearly-polarising filter in place (with its optical axis pointing vertically) . . .

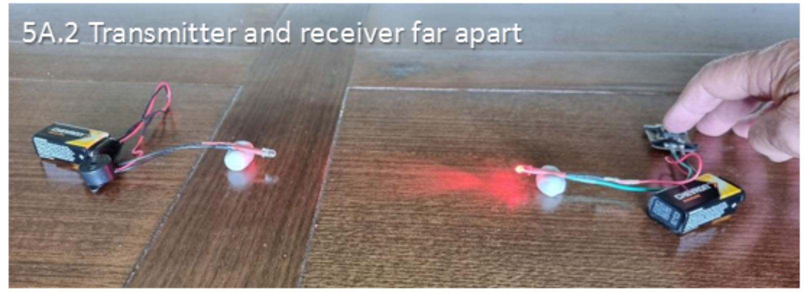
4C.2 Can you see any light scattered from the light beam?

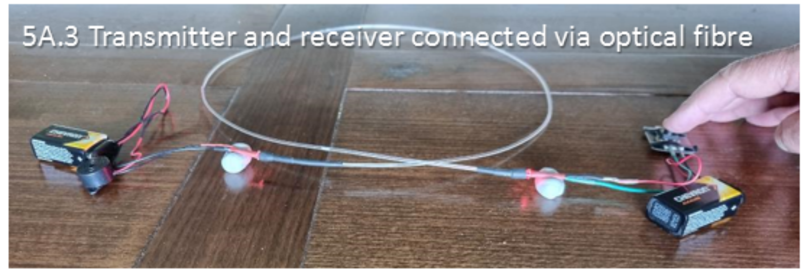
With the linearly-polarising filter in place (with its optical axis pointing horizontally) . . .

4C.3 Can you see any light scattered from the light beam?

Module 5 Example A: Optical Fibre, Transmitter, and Receiver


5A.1 Transmitter and receiver close together


5A.2 Transmitter and receiver far apart


5A.3 Transmitter and receiver connected via optical fibre

The experimental setup:
The circuits are connected so that the transmitter and receiver are facing each other and close together.
Next we move the transmitter and receiver far apart, but still facing each other.
Finally, while the transmitter and receiver are still far apart, we connect a long optical fibre between the LED and the phototransistor.

Predictions 5A (Record your prediction on the Prediction Sheet.)

Initially, the transmitter and receiver are facing each other and close together.
When the switch is closed and the LED illuminates….

5A.1 Will the sound from the phototransistor buzzer be loud or soft?

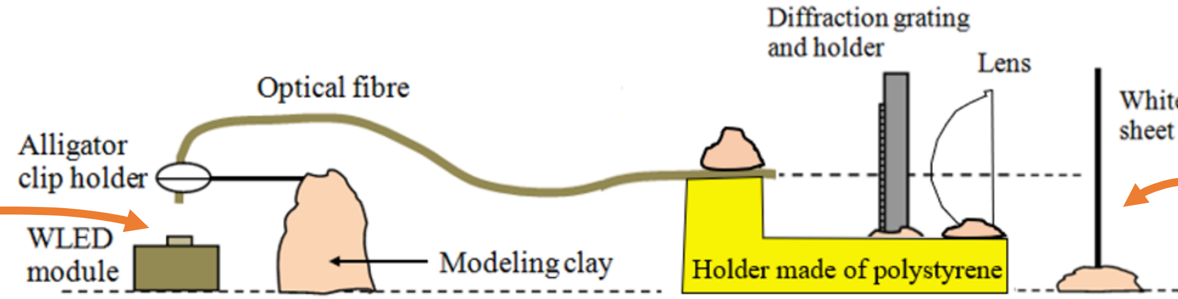
Next, we move the transmitter and receiver far apart, but still facing each other.

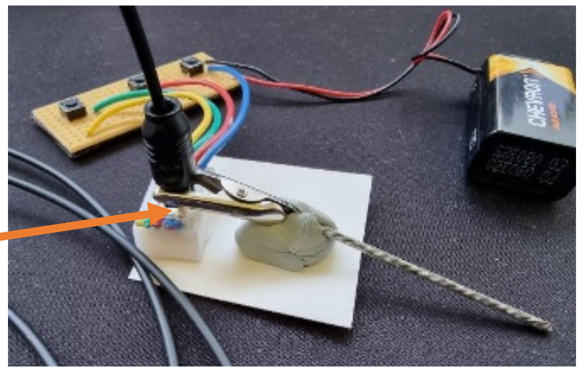
When the switch is closed and the LED illuminates….
5A.2 Will the sound from the phototransistor buzzer be louder, the same, or softer (than the initial case)?

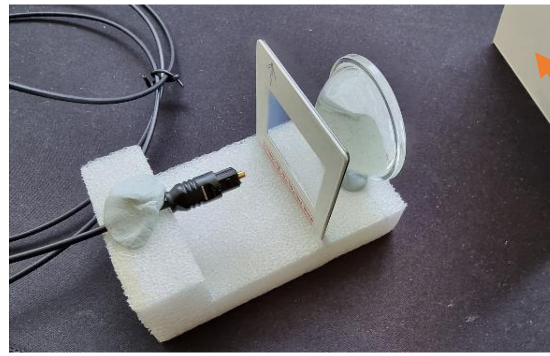
Finally, while the transmitter and receiver are still far apart, we connect a long optical fibre between the LED and the phototransistor.
When the switch is closed and the LED illuminates….

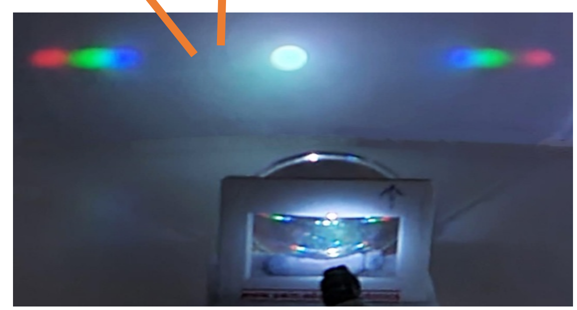
5A.3 Will the sound from the phototransistor buzzer be louder, the same, or softer (than the initial case)?

Module 5 Example B: Transmitting Multiple Data Streams Simultaneously Down an Optical Fibre

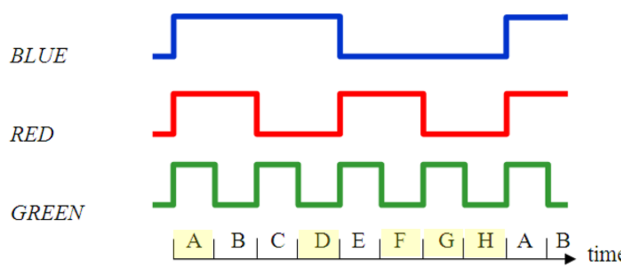








For **five** of the time periods (A, D, F, G and H), we want you to predict what you will see in the central un-scattered image, and the scattered (or diffracted) left and right images.



Predictions 5B (<u>Record your prediction on the Prediction Sheet.)</u>

5B1 Sketch un-scattered & diffracted images for time A

5B2 Sketch un-scattered & diffracted images for time D

5B3 Sketch un-scattered & diffracted images for time F

5B4 Sketch un-scattered & diffracted images for time G

5B5 Sketch un-scattered & diffracted images for time H