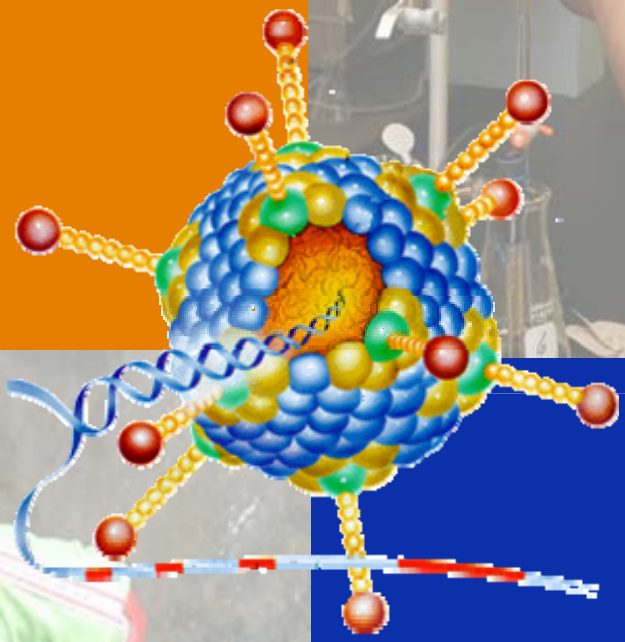
Spearing Fish

Lab Book



The waterCAMPWS
Center for Advanced Materials
for Purification of Water with Systems

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University of Illinois at Urbana-Champaign

Overview

This lab demonstrates the refraction of light and gives the experimenter an idea of the ease or difficulty in spearing fish

Materials and Equipment

Materials required for this lesson are (for each group of students):

- Styrofoam cup
- Fish
- Elmers glue
- 1 ½ ” wide tape
- Pencil
- Ruler taped up right on the edge of a table or use a chemistry base and rod.
- Paper to mark the spots for the edge of the cup.

Procedure

1. Before beginning the experiment, develop a hypothesis about the effect of water on the appearance of fish under water. Write your hypothesis below:

2. Put a piece of masking tape across the diameter of top of the cup.

3. Line your head up on one of the rods at the edge of the table.
4. Move the cup so that you only see the tip of the fish fin.
5. Draw a circle around the bottom of the cup.
6. Add water to almost fill the cup
7. Line your head up on one of the rods at the edge of the table.
8. Move the cup so that you only see the tip of the fish fin
9. Again, draw a circle around the bottom of the cup.
10. Measure the difference between your two circles.

Figure 2

The Good, the Bad, the Silly…

Writing a good hypothesis is harder than you think. For example:

When it gets cold, water turns to ice.

is an acceptable hypothesis, but not very helpful, since there are temperature ranges of "cold" when ice wouldn't form.

A better hypothesis would be:

When the temperature reaches 32 degrees Fahrenheit and remains at that temperature, water turns to ice.

The hypothesis:

When the temperature reaches 32 degrees Fahrenheit and remains at that temperature in a room with three windows that face North on a Sunday, water turns to ice.

While this last statement may be true, it contains a lot of unnecessary detail that makes it of little practical value, since there are lots of conditions that will cause ice to form that are excluded in this hypothesis.

Results

1. What was the distance between the two circles in the above experiment?

2. Draw a diagram of the two circles in relationship to each other and label the distance between them.

Analysis

1. Based on the results of this experiment, where you would throw your spear? Why? What evidence supports your answer?

2. In your own words, define refraction.

3. How are refraction and reflection related to each other?

4. Why is it important for engineers to understand the relationships and laws the govern refraction and reflection? How would they use this understanding in water purification?