

Getting it Right with Light Lab

Teacher's Guide

Topic:

Light and Color

The following information is provided to the student:

Question:

What model of light and of Polaroid filters would provide a suitable explanation of how they work?

Purpose:

To explore Polaroid filters and to develop and describe a model which explains how they work.

A complete lab write-up includes a Title, a Purpose, a Data section, and a Conclusion/Discussion of Results. The Data section should include a documented record of the tests which were performed with the filters and the corresponding observations and results. The record should be clear and accentuated by diagrams and sketches. The Conclusion/Discussion should present a logical model of filter construction and light behavior and should utilize the model to explain how the filters and the set of filters serve to filter light. The discussion should be supported by specific references to evidence which was documented in the Data section.

Materials Required:

Demonstration Polaroid filters; Polaroid filters or 3-D Polaroid glasses; non-metallic reflecting surfaces.

Description of Procedure:

The teacher initiates the introduction to Polaroid filters by demonstrating the result of viewing an object through a single filter and through a set of two filters. While looking at an object through both filters, observations are made as one of the filters is slowly rotated through a 360° rotation angle. Students record their observations. Polaroid glasses (the variety used to view 3D films) are then passed out to students. They look through the glasses with one eye closed (or covered) at the glasses of other students; they repeat the process for the other eye. They rotate the glasses 360° as they look with one eye through the filter at another student's eye. They conduct other tests and document and organize their results in an effort to understand the interaction between the filters and the light.

Alternative Materials and Procedure:

Alternative materials and procedures are not recommended.

Safety Concern:

There is always a higher than usual level of risk associated with working in a science lab. Teachers should be aware of this and take the necessary precautions to insure that the working environment is as safe as possible. Student *horseplay* and off-task behaviors should not be tolerated.

Suggestions, Precautions, Notes:

1. The activities of this lab could just as easily be performed as part of a teacher delivered lecture-demonstration. Including the activity as part of a lab forces students to document some findings, to

The Laboratory

think about their significance, and to utilize language to express their understanding of the phenomenon of polarization.

2. Students will need some guidance in this lab. The value of the lab is not in the discovery of the model of polarized light (which is not likely to occur without guidance) but rather in the cognitive effort which is expended as students attempt to explain the model, the process of polarization, and the application to the observations made in this lab.
3. Provide students an opportunity to view reflected light from non-metallic surfaces such as lab tables and the floor. Instruct students to look for a glare off of such surfaces and then to slowly rotate a filter as they look with one eye through the filter at the glare.

Auxiliary Materials:

None

Scoring Rubric:

L4. Getting it Right With Light	Score
____ Included, labeled and organized all parts of the lab report. ____ Data section includes a documented record of the various tests performed with the Polaroid filters. Record is clear and follow-able; reveals a strong ability to document an experimental investigation. ____ Conclusion/Discussion proposes a physical model of filter construction and light behavior. The model was used to explain the various observations which are documented in the Data section. The discussion is thorough, organized and accurate; reveals a good understanding of Polaroid filters and the role of a scientific model.	____/____

Connections to The Physics Classroom Tutorial:

The following reading is a suitable accompaniment to this lab:

<http://www.physicsclassroom.com/Class/light/u1211e.cfm>

Connections to Minds on Physics Internet Modules:

Sublevel 2 of the Light and Color module is a suitable accompaniment to this lab:

<http://www.physicsclassroom.com/mop/module.cfm>