

Will the Light Shine?

Grade 1: Light Probe

Aligned with National Standards

overview

Students will observe the effects of different materials on light waves.

This activity uses the WARD's Single Light Probe to collect data, allowing students to focus on the science discovery and leaving more time for learning and developing higher level thinking skills.

time requirement:

This activity can be completed in one session of 20 minutes.

materials required for the activity:

WARD's Single Light Probe
Flashlight
Wax paper (or tissue paper or color acetate)
White paper
Cardboard
Mirror
Clear plastic
Instructions (this guide) and copy of data tables (page 7)

safety precautions

general safety:

- Read all instructions before starting the lab activities. Review the lab procedures and safety precautions with your students and remind them to ask questions.
- Consider establishing a safety contract that students and their parents must read and sign. This is a good way to identify students with allergies (e.x. latex) so that you (and they) will be reminded of specific lab materials that may pose risks to individuals.



WARD's in-house scientists are always on call to assist you with your questions. Our experts can provide personal solutions and product advice for your curriculum.

Email sciencehelp@vwr.com
or call 800-962-2660 to get started.

framework for K-12 science education © 2012

DIMENSION 1 Science and Engineering Practices	×	Asking questions (for science) and defining problems (for engineering)		Use mathematics and computational thinking
	×	Developing and using models	×	Constructing explanations (for science) and designing solutions (for engineering)
	×	Planning and carrying out investigations		Engaging in argument from evidence
		Analyzing and interpreting data		Obtaining, evaluating, and communicating information
DIMENSION 2 Cross Cutting Concepts		Patterns		Energy and matter: Flows, cycles, and conservation
	×	Cause and effect: Mechanism and explanation	×	Structure and function
		Scale, proportion, and quantity		Stability and change
	×	Systems and system models		
DIMENSION 3 Core Concepts	Discipline		Core Idea Focus	
	Physical Sciences		PS4.A: Wave Properties	

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NGSS STANDARDS	Elementary School Standards Covered	
	1-PS4-3 Plan and conduct an investigation to determine the effect of placing objects made with different materials in the path of a beam of light.	

national science education standards © 1996

Content Standards (K-12)			
	Systems, order, and organization		Evolution and equilibrium
×	Evidence, models, and explanation	×	Form and function
×	Constancy, change, and measurement		
Physical Science Standards Elementary School			
×	Light, Heat, Electricity, and Magnetism		

× Indicates standards covered in activity

prior to class

- Review information about how to use and read the WARD's Single Light Probe.
- Since the intensity of light is dependant upon the distance between the flashlight and the light probe, it may be helpful to place three pieces of masking tape on a desk or table. For the best results, the pieces of tape should be parallel to each other and 5 cm apart. The test material should be held at the center position and the flashlight should be on one side and the probe on the other. Keeping the science tools and test materials at these positions for all trials will keep consistency for the activity.
- Use the light probe and flashlight to test the materials (*see the procedure*) in order to confirm the Lux setting. The Ward's Single Light Probe has two settings: 1,000 Lux and 6,000 Lux. If your trials are always reading 1,000 Lux then change the setting to 6,000 Lux.
- Make a copy of the data tables (*page 7*) for the class to use during the activity.

objective

Students will determine the effect of placing objects made with different materials in the path of a beam of light.

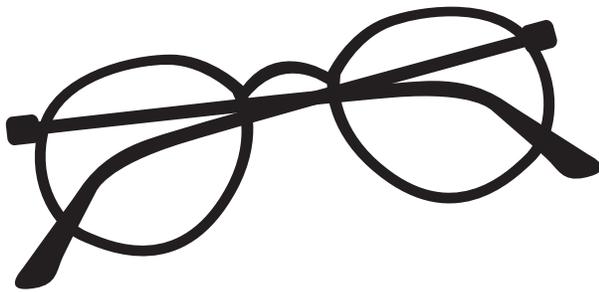
background

Humans need light to see. We see objects because light reflects or bounces off the object. The object "blocks" the path of the light. Some light is actually absorbed by the object. Some objects allow light to pass completely thru them. We understand these objects to be clear or transparent.

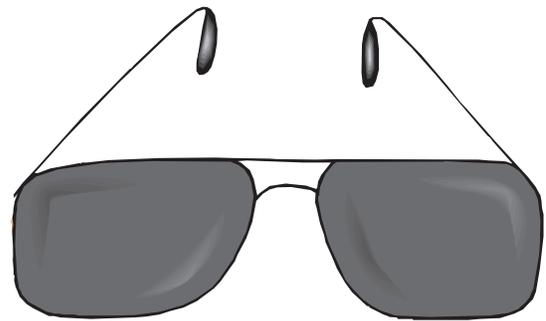
Light and its behavior in relation to objects of different materials can be studied because light travels in straight lines. Because we see light all around us, this idea of it traveling in a straight line can easily be forgotten. The best way to demonstrate this is to think of an object casting a shadow. The light does not bend around the object. Light travels out in straight lines or waves from all sides of most light sources (like the sun) unless it is directed in a specific direction (like a flashlight). When the straight path of light is blocked by a solid object, a shadow is formed.

build upon prior knowledge:

- Ask the students to look at the pictures below and ask the students how the glasses are different. Ask the students when or where they would use the clear glasses opposed to the sun glasses. Lead them to understand that the clear glasses let light thru them and the sunglasses would stop some of the sunlight from getting to their eyes. *(Student responses could include: Regular glasses are clear and are used when taking a test or watching a movie. Sunglasses are not clear and are used when outside on a sunny day.)*



Regular glasses



Sunglasses

- Ask the students to think about other objects that allow light thru. Ask them to think of other objects that block light, cause shadows or shade. *(Student responses could include: Clear objects - car windshield and house windows. Objects that block some or all light - walls, curtains, sun hat, sun block lotion and patio or beach umbrella.)*

(continued on next page)



guiding questions

- ✦ What do you think will happen? (Hypothesis)
- ✦ What do you expect to learn?
- ✦ What tools are needed?
- ✦ How can we record our findings?



teacher notes

- ✦ Since the intensity of light is dependant upon the distance between the flashlight and the light probe, make sure the distance between the tools and the test materials are consistent for each trial.

procedure

1. Show the different test materials to the students and ask them to think about whether light will pass thru them or be blocked by it.
2. Ask the students to predict the materials effect on a path of light. Have the students use a ranking system of 1 thru 5. 1 will represent no light passing through, 3 would represent some light passing thru and 5 will represent the most light passing through. Record their predictions in data table 1.
3. Divide the class into 5 groups and give each group a test material.
4. As the whole class observes, take turns visiting each group with the flashlight and light probe. From each group, have one student hold the flashlight in position, one student hold the test material in front of the flashlight, and one student hold the light probe behind the test material and announce the reading. Another student can record the Lux reading in data table 2. With each group, keep the distance between the tools and test materials consistent. (*see prior to class, page 4*)
5. Review the data with the students, comparing it to the student predictions. Ask the students which material allowed the most light through and which material didn't allow any light through.

summarize

Ask students what they have learned about how light travels through different materials. (*Student responses may include: Some materials are clear and let all light thru. Some materials stop some light. Some materials are solid and block or reflect all light.*)

extension

Ask students what other materials they might want to try and test.

To see the effect of distance on a lights brightness, an experiment could be done recording the Lux at different distances from the flashlight. Also, trials could be done using the light probe to test different light sources to understand there are different intensities of light.

data table 1 - predictions:

1 - no light will pass thru, 3 - some light will pass thru, 5 - all light will pass thru

Material	Rank
Wax paper	
White paper	
Cardboard	
Mirror	
Clear plastic	

data table 2 - actual light readings:

Material	Lux Reading
Wax paper	
White paper	
Cardboard	
Mirror	
Clear plastic	

