

DAY LIGHTING

- Grade Level: 4-6
- Subjects: Science, Language Arts
- Suggested Time: 2 hours



Using a light meter, explore the possibilities of day lighting in the classroom.

Materials

Light meters (available commercially), Day Lighting Worksheet, the Ohio School Design Manual light level chart (make copies or display by projector), and colored paper and markers.

Ohio 2010 Standards

Science:

- Changes in an organism's environment are sometimes beneficial to its survival and sometimes harmful. (4)
- Light and sound are forms of energy that behave in predictable ways. (5)
- The sun is one of the many stars that exist in the universe. (5)
- Science inquiry and applications. (4-6)

Language Arts:

- Refer to details and examples in a text when explaining what the text says explicitly and when drawing inferences from the text. (4)
- Interpret information presented visually, orally, or quantitatively. (4)
- Determine or clarify the meaning of unknown words and phrases based on grade level reading and content, choosing flexibly from a range of strategies. (4, 5)
- Determine the meaning of words and phrases as they are used in a text, including figurative, connotative and technical meanings. (6)
- Conduct short research projects that use several sources to build knowledge through investigation of different aspects of a topic. (4-6)
- Draw on information from multiple print or digital sources, demonstrating the ability to locate an answer to a question quickly or to solve a problem efficiently. (5)
- Gather relevant information from multiple print and digital sources; assess the credibility of each source; and quote or paraphrase the data and conclusions of others while avoiding plagiarism. (6)

Objectives

The student will be able to:

- Define day lighting.
- Answer reading comprehension questions from a selection about day lighting.
- Measure light values with a Kill A Watt meter.
- Compare data to the Ohio School Design Manual light level chart.
- Identify where natural light can replace electric lights.

Introduction

- Before students enter the room, open the shades or blinds, if there are windows. Leave the lights on. Once class begins, switch off the lights and ask students which lighting they prefer. Usually students prefer natural light. Help students identify natural vs. electric light.
- Ask the students to briefly discuss why they prefer natural light. If needed, help them connect their preference for the lights being off to a preference for natural light. Possible answers include that natural light is more calming, comfortable, not too bright, and that people like sun.
- Explain that today they will use a light meter to study one method of reducing cost and energy use, called day lighting.

Activities

- Distribute a copy of the Day Lighting Worksheet to each student. As a class or individually, students should read the selection about day lighting and the answer questions. Go over answers to make sure students understand the answers.
- Show students how to use a Kill A Watt meter by measuring the light in the classroom with the lights on and blinds shut vs. lights off and blinds open. Allow students to try it themselves from different places in the classroom. Students should record data in a log, noting where they measured the light, what type of light was present (natural, electric, or both), and the light value in foot candles.
- As a class, search the school for locations where day lighting could be used. Use the light meter to measure the light value in foot candles. Try areas such as:
 - empty classrooms
 - hallways
 - cafeteria
 - offices
 - library
 - gym
- Wherever possible, turn off electric lights to measure natural lighting.
- Back in the classroom, help students compare their findings to the Ohio School Design Manual light level chart (distribute copies or display by projector). If students are not able to read the chart by themselves, just point out the appropriate values and ask if they are greater than or less than the values they measured.

- Students should identify areas where lighting values exceed the Ohio School Design Manual recommendations, and list locations in the school where day lighting could be used to lower energy costs. Record on Day Lighting Worksheet.
- Students can make signs and place them next to light switches and windows, reminding people to turn off the lights and open the blinds or shades during the day.

Extensions

- Encourage students to create a day lighting plan for their homes. Students may discuss and implement the plan with their families.
- Students may draw a design for a school or home that would optimize day lighting potential through the placement of windows. Help students to consider the direction of the sun throughout the day and orient the building accordingly. Display drawings in the classroom.

Closing

After reviewing the lesson, create a plan for using day lighting in the classroom. Under what conditions will natural light, electric light, or a combination be used?

Worksheets

See: Day Lighting Worksheet

See: Recommended Light Levels
